THE
ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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THE UTILISATION OF SURPLUS ENERGY.

THE question how best to utilise the surplus energy available from a hydro-electric installation during light-load periods is one of great interest and importance. Obviously, if a load factor of 100 per cent. can be secured, the cost of the kilowatt-hour will be greatly reduced, owing to the distribution of the fixed charges over a greater output; even with the most diversified industrial and domestic demands, it would be unduly optimistic to hope for a load factor much above 50 per cent., so that in general, by raising the load factor to 100 per cent., it should be possible to reduce the fixed charges per unit by about one-half. The running charges being small, the resulting total cost per unit would be extremely low. In the case of a steam-driven station the advantage would not be so great, owing to the proportionately increased cost of fuel and labour; but subject to this qualification, the gain is very important. It is often suggested that one of the best methods of thus filling up the valleys in the load curve is to install electrochemical or electrometallurgical plant, working on processes which can be regulated according to requirements without affecting the value of the product; a correspondent of the *Revue Générale de l'Electricité* has suggested an ingenious system for the utilisation of surplus energy, or, more generally, we would say surplus plant capacity. He proposes to produce oxygen and hydrogen by the electrolysis of water, and, as the market for hydrogen gas is restricted, to utilise it for the extraction of nitrogen from the air by the simple process of combustion, the nitrogen being afterwards employed in the manufacture of calcium cyanamide and synthetic ammonia, from which nitric acid can be readily obtained. The nitrogen and oxygen can also be used for the production of nitric acid by means of the electric arc, and the manufacture of nitrate of ammonia provides another outlet for the products of the works. In times of peace there is a continual demand for cyanamide and ammonium nitrate as fertilisers, a demand which, under the new conditions of intensive agriculture that will obtain in the future, is certain to increase; at the same time, while we hope there will never be another great war, it is impossible to exclude that eventuality from consideration, and the possession within our own borders of sources from which high explosives can be obtained, a precaution so strongly advocated by Mr. E. K. Scott both before and during the war, will constitute a valuable safeguard. We do not suggest that the process above referred to is the only one applicable to the purpose in view—the utilisation of surplus plant capacity—or even the best one; but its simplicity and elasticity render it worthy of consideration, and when we proceed to the erection of big central power stations it will be a matter of the first importance to provide them with ancillary factories suitable for the purpose of maintaining the demand upon the costly generating plant at a load factor approaching 100 per cent.

Belgian and Swedish Railways.

Events are moving rapidly in connection with the war, and in regard to the indirect results which have been produced in neutral countries through the condition of hostilities. The watchword everywhere now is independence of external resources as far as any country's internal conditions will permit. In the case of Sweden, whose native coal supplies are practically insignificant, the comparative scarcity of imports of coal during the war has brought about circumstances in that country which it is hoped will not recur at any future period. The railways there, despite the alteration of many locomotive furnaces so as to permit of the use of wood fuel, have keenly felt the shortage of coal, which has become accentuated as the weary war months have passed away. Recognising the gravity of the situation, the Swedish Government as far back as December, 1915, instructed the State Railway authorities to investigate the question of the conversion of the State Railways to electric traction, and the end of September this year has witnessed the conclusion in its main features of the protracted inquiry. The preliminary report states that it is necessary to introduce electric locomotion partly on the ground of the enormous increase in the prices of coal—that from German sources is threatened with a further advance due to an export tax after the war—and partly owing to the necessity for extending the railway system. It is considered by the railway authorities that the work of transformation could be completed in a term of 10 years, and for this purpose there are available the water powers of the Lagan, Gota River, Motala River, Dal River, Indals River, the Ume River, and power plant on the Lule River. The requisite waterfalls are in Government ownership, and several great power stations are already in operation. It is calculated that the power available would allow of the laying of mains also for the supply of light and power, particularly for the use of agriculturists, and it is stated that the apprehension that the plant might be damaged during war-time has been overcome.

The situation of Belgium is not precisely the same as that of Sweden. When the whole of Belgium has been cleared of the enemy, it is thought that many of the railways will be found to have been destroyed, and the work of reconstruction will, consequently, have to be commenced. Before the war the railway system of Belgium was the greatest throughout the world in proportion to the country's superficial area. Some time ago the Belgian Government, among the various Commissions appointed to prepare schemes for the restoration of the country on the termination of hostilities, nominated a Railway Commission to draw up a report on the position, and this Commission has reached the conclusion that it will be more advantageous to adopt electric than steam locomotion on the whole of the railway network. This decision has not been prompted by any scarcity of coal, although the coal production in pre-war days was only able to satisfy the domestic requirements, seeing that exports and imports were approximately equal. It is considered, however, that the near future will present a favourable opportunity for proceeding with a gigantic change for the improvement of the means of communication, which would scarcely have been undertaken, as far as can be seen, but for the war.

The New Hydro-Electric Works in France.

A problem of considerable interest has arisen in France which also has indirect application to other of the Allied countries. It relates to the hydro-electric works which have been erected for the execution of war contracts during the course of hostilities, on land or riparian property requisitioned by the military authorities for this purpose. What France has accomplished in this direction, partly owing to the scarcity of coal, will only be known definitely after the conclusion of the war. Many manufacturers in the early period of the war were encouraged, if not compelled, by the Ministry for Armaments to establish new installations very promptly, the first result being the presentation by some speculators of such extortionate demands for the transfer of their rights as to threaten to bring about the failure of the schemes. Under the existing law the projected works could not be declared of public utility, as it was impossible to do so if the waterfall was not intended for the supply of energy to the public. In order to overcome this difficulty the Government requisitioned the properties in question, and it was then possible to begin operations. This step merely served to postpone the problem, as the effects of the requisition will cease with the discontinuance of the war, when the owners of the lands will be able to demand the payment of a considerable sum, or the return of their property. The manufacturer will then either have to submit, and become financially burdened with a dead load on his undertaking, or he will prefer to abandon the works, with the result that a source of power will incur the risk of being no longer utilised.

It is considered that this eventuality is all the more regrettable, inasmuch as a general Bill awaiting consideration—the Hydro-Electric Works Bill—provides that works for the utilisation of falls exceeding a yield of 500 kw. shall form the subject of a concession, whatever be their object, and be capable of benefiting by the right of expropriation of the land or property concerned. On the other hand, the Bill further provides that the owners of existing installations can elect to place themselves under the proposed new *régime* or remain subject to the present laws, but on condition that the undertakings revert to the State on the expiration of a period of 75 years. Such arrangements, in the opinion of M. G. Tochon, as published in *L'Information* of October 1st, would compromise the fate of the falls brought into use during the war, and cause serious prejudice to the national economy. The Government, however, has desired to obviate this by causing undertakings representing a capacity of over 500 kw. to benefit by the first clause of the Bill relating to the definite continuance of public works carried out during the war. This Bill—the War Works Bill—relates chiefly to railways, roads, works at seaports and inland navigation improvements, aviation camps, and hydro-electric works which have been executed without the fulfilment of the legal formalities applicable to permanent works. Most of those works will be capable of being adapted for peace purposes, and will have to be continued, and it will, therefore, be necessary on the cessation of hostilities to decide which shall be maintained and which shall be discontinued. As a consequence, it will be essential to preserve those works which have been erected on requisitioned property from losing their position immediately on the return of peace. Under these circumstances, the first clause of the War Works Bill provides that until the expiration of two years from the year of the termination of hostilities, no action can be taken by landed property-owners for the return of lands occupied by military requisition, and serving for public purposes, without the legal formalities appertaining to peace times being fulfilled.

If, on the arrival of the appropriate time, it be decided to continue the war-time established works, a decree will be issued by the Council of State equivalent to a declaration of public utility. This will have the effect of exempting the Government from the observance of the formalities under the old law of 1841, in so far as inquiries are to be made, and then the expropriation will be proceeded with and the compensation settled, as provided for under that law. As, however, there could be no question in the present state of legislation, as already previously explained, of submitting hydro-electric works established during the war for military purposes to the procedure applicable to public works, the War Works Bill stipulates that these particular works shall benefit by the period of two years, during which the right of action shall not lie in regard to requisitioned lands, although the capacity of the undertakings concerned must exceed 500 kw. The limitation to works of over this power is due to the fact that a concession is provided for in the Hydro-Electric Works Bill before the Chamber of Deputies only in the case of works of this size, whilst the other installations of lower powers will remain subject to the authorisation under which they were created, and will consequently escape reversion to the State. The period of two years has been fixed because the Government hopes that in the meantime the general Bill relating to hydro-electric works will be adopted by Parliament.

ELECTRIC TRACTION ON THE CENTRAL ARGENTINE RAILWAY.

(*Continued from page* 365.)

The high- and low-pressure portions of the turbines are in separate cylinders, the high-pressure cylinder being of cast-steel; this was steamed with superheated steam for 24 hours both before and after blading. The rotor shafts and drums are forged solid of steel with a tensile strength of 35 to 40 tons and an elongation of 20 per cent. The blades are of brass. Between the turbine and the hand- or electrically-operated main exhaust valve is an atmospheric release valve. The speed between no load and maximum load can be varied 5 per cent. up or down while the turbine is running, and can be controlled from the switchboard by electrical means.

The condensing water is taken from a pump house on the River Lujan through two 27-in. diameter pipes about 500 yards long, and is discharged into a small creek somewhat nearer the power station.

The condenser shells are cast-iron, and the tube plates are of rolled brass 1⅛ in. thick. The tubes are of ¾ in. external diameter, and are of solid drawn copper of No. 18 S.W.G. Aluminium blocks are fixed in the water chambers in metallic contact with the tube plates.

The circulating water pump bodies are of cast-iron and the impellers are of gun metal. The motors are housed in a steel-framed, corrugated-sheet-iron house erected on a wooden jetty; one side of the jetty consists of two screens of expanded metal, arranged so that one screen at a time can be raised for cleaning.

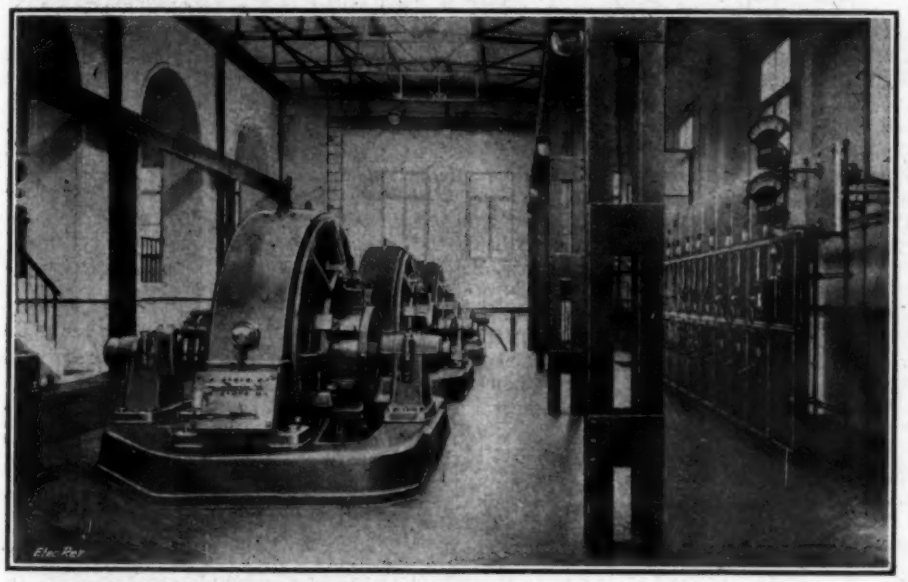

Fig. 7.—Interior of Sub-station.

In addition to the main circulating-pump motors, the jetty carries a centrifugal pump capable of delivering 300 gallons per minute against a head of either 20 or 95 ft. This supplies water through a 6-in. diameter pipe either to the purified water reservoir or direct to the storage tanks in the pump house. Two motor-driven air exhausters are also located in the pump house, each capable of producing in three minutes a vacuum of 20 in. in any one of the main pumps, including its suction pipe and discharge pipe up to the discharge valve.

The main pump motors are started by means of oil-immersed auto-starters, consisting of two separate single-phase transformers and the starting switch. Each motor is connected by a separate cable to one of the unit distribution boards in the power house.

Owing to the swampy nature of the ground between the river and the station, it was not possible to lay the circulating-water pipes direct in a trench. Instead they were erected on cross bearers carried by pairs of wooden piles driven down to the tosca. The cables are carried on angle irons supported from the cross timbers. The pipes, which are of steel, are lapped with tarred Hessian tape.

The alternators are totally enclosed, and ventilated by fans on the rotor which draw air from the basement through a dry air filter and discharge it outside the engine room. The combination of an alternator and a step-up transformer as one generating unit permitted the actual alternator voltage to be selected so as to give the most simple and robust stator winding; the stator slots, which are completely closed, each contain only one conductor. The rotors are of the built-up plate construction, with a distributed winding in slots, and are fitted with mild steel slip-rings.

The step-up and unit transformers belonging to each generating set are housed in a separate chamber in the basement, with hatchways in the engine-room floor through which they can be handled by the crane. The chambers are ventilated by fans which draw air from the basement, and provision is made for running off the oil from the transformers to the outside of the building in case of fire. Each step-up transformer has its own oil cooler, through which the oil is circulated by a rotary pump driven by a 10-H.P., 440-volt, three-phase, squirrel-cage motor. The unit transformers are air-cooled. The station transformers are situated in separate chambers at the ends of the engine room basement, and are air-cooled.

The main step-up transformers are of British Westinghouse make, of the three-phase shell type, oil-immersed, with mesh-star connections, and are rated at 4,860 K.V.A.; the unit transformers, of similar type, are of 250-K.V.A. capacity, and the station transformers of 1,250-K.V.A. capacity. The lighting motor-generators, made by the British Thomson-Houston Co., Ltd., comprise each a 55-KW., D.C. generator driven by an induction motor, with a 10-KW. battery-charging booster.

All main switching is carried out at 20,000 volts. The main switchgear is located in a bay on the side of the engine room opposite to the pump house and boiler house, the operating gallery being raised about four feet above the engine-room floor, so that the operator has a good view of all the machines. The generator panels, which are in the middle of the gallery, are set round a recess, so that all the instruments and gear can be seen from one position (fig. 4). The station transformer and feeder panels stand on either side of the generator panels, parallel to the axis of the engine room.

Each operating panel consists of two cast-iron plates built into a wall of moulded concrete, 11 ft. high, faced with glazed titles; this wall is set forward 3 ft. from the main panels, and at the back carries the auxiliary wiring, which is run as vulcanised india-rubber-covered cable on porcelain racks. In the case of the generator panels, the instruments (of the edgewise pattern, and comprising an ammeter, voltmeter, power-factor meter, and indicating wattmeter) are mounted on the wall above the upper cast-iron plate. Below them are the red and green indicating lamps which show whether the oil switch is closed or open. The upper cast-iron plate carries the oil-switch operating handle, and, interlocked with it, the handles controlling the cable and bus-bar isolating switches. Below the oil-switch lever are the automatic trip coils, and above it

the time-limit fuses. The voltage regulator is mounted on the wall to the left of the plate. The bottom plate carries the integrating wattmeter, the exciter field switch, the governor control switch, and the change-over switches for the voltage regulator and the ammeter.

In front of each generator panel is a pedestal carrying the exciter ammeter and voltmeter, and the handwheel which operates the exciter field rheostat, mounted on an intermediate floor in the basement. A second pedestal carries the transmitter of an electrically-operated telegraph by means of which the switchboard attendant can communicate with the driver when synchronising. Similar instruments mounted at the front of the gallery give communication to the boiler house.

The main panels are formed of moulded concrete cubicles 5 ft. wide; the main wall is 9 in. thick, and the sides of the cells are 4 in. thick. Intermediate floors, 4 in. thick, separate each cubicle into five storeys, which (starting from the bottom) are occupied as follows:—

(*a*) Potential transformers (fig. 5); (*b*) cable isolating switches and current transformers; (*c*) oil switch (fig. 6); (*d*) bus-bar isolating switches; (*e*) bus-bars. The different compartments are protected by screens of expanded metal interlocked with the main switch, so that they can be opened only when the switch is open. The whole structure was moulded in position, the holes for the apparatus being cored out so that no cutting of the work was required. Porcelain only is used for insulation, and in general, connections are made with bare copper, a minimum spacing of 15 in. between phases and to earth being adopted; where there is risk of conducting fumes causing short circuits, the leads are covered with porcelain tubes. Small wiring in the cells is kept down to a minimum, and is run as rubber-covered cable on porcelain cleats.

The three phases of each high-pressure switch are contained in one tank, which is built up of wrought-iron plates with special stiffening channels to take care of the maximum pressure generated in the tank when the switch opens on a fault. A vent pipe leads from the top of the tank to the outside of the switch cubicle, to carry off any gases that may form. The leads to the switch terminals are introduced into the tank through cast-iron "U" bends filled up solid with compound. Provision has had to be made for the expansion of this compound in hot weather, otherwise the bends or porcelains are liable to crack.

The current transformers are compound filled and iron-clad. They are of two types, one suitable for mounting against a wall, the other passing through the floors between the compartments of the panels. The use of the latter saves floor insulators and economises space. On the generator panels current transformers are provided for the instruments, the protective devices, and the voltage regulators.

The potential transformers are oil-immersed and self-cooled. Isolating switches and fuses are installed between them and the cable terminals, so that a faulty transformer can be isolated from the rest of the switchgear.

The unit distribution boards are built up of enamelled slate panels, and have the bus-bars mounted in front; porcelain handle fuses connect the bus-bars to studs which pass through the slate to the motor leads at the back. The oil switch controlling the feeder cable from the unit transformer is mounted at the back of the panel, along with the current transformers for the trip coils and instruments. Bus-bar isolating switches are mounted on the front of the incoming feeder panel.

The main motor distribution board is of slate panels similar to the unit distribution board. It is surrounded with expanded metal to prevent articles from falling on it from the engine room floor above.

Feeders are run from the station distribution board to the station auxiliaries, and also to the unit distribution boards, so that the latter can be made alive when a supply is not available from the unit transformers, *e.g.*, when starting up or shutting down a generator. In order to avoid any risk of paralleling a generator out of phase through its unit transformer, the switches on the two feeders to each unit distribution board (viz., from the unit transformer and the station distribution board) are interlocked, so that only one can be closed at once. They are also so arranged that the change-over from one supply to the other can be so quickly effected while the auxiliary plant is running, so that there is no appreciable drop in the speed of the motors.

At each end of the switchboard gallery is installed a 110-volt, D.C. board to control the supply from the lighting motor-generators to the lighting circuits and the batteries. Two 250-ampere-hour Tudor batteries provide current for the indicating lamps on the main switchboard, the trip coils of feeders, electric telegraphs, and a stand-by to the lighting system. The end cells of each battery are cut in or out of circuit by a solenoid-operated, remote-controlled regulating switch.

The line at present electrified is served by three traction sub-stations. The buildings are all steel-framed structures, walled with brick covered with armoured cement plaster. The floors and roof are of concrete reinforced with Clinton fabric, the roofs being flashed with $\frac{3}{4}$ in. of rock asphalt. Provision is made at the sub-stations for housing the attendants.

Each building is divided into three main aisles, the centre one containing the rotary converters and transformers and the side ones containing the high-pressure and direct-current switchgear respectively (fig. 7). There is a loading bay at one end, into which a siding runs, so that railway trucks can be brought under the overhead crane which traverses the whole building. Provision is made for extension of the building at the end away from the loading bay, when it is necessary to install further converter sets. The basement contains the main transformers, the potential and current transformers, the high and low-pressure feeders, rotary field rheostats, and battery. On the first floor are situated the rotaries, the 800-volt switchgear, a motor-generator, and, on a raised gallery, the high-pressure operating gear.

The high-pressure gear is similar to that in the power station; the bus-bars are sectioned and interconnected by an oil sectioning switch, the two halves of the bars being fed by different cables.

The direct-current switchboard is built up of panels supported on a pipe framework. A single-pole circuit-breaker with overload and reverse current tripping coils, and a knife switch which isolates the circuit-breaker from the bus-bars, are mounted on a marble panel at a height of about 8 ft. from the floor. Marble partitions between adjacent panels form separate cubicles, and prevent the arc from a breaker which opens on a fault from travelling to adjoining switches. The switches are operated through wooden rods and porcelain insulators by handles which project through cast-iron panels mounted about 14 in. in front of the marble slab. In this way, all live metal in front of the board is placed out of reach of a person standing on the floor. The generator panels carry hand-wheels for operating the rotary field rheostats, which are mounted in the basement directly below the board. Differential relays are provided to prevent a circuit-breaker from being closed when the polarity of its rotary is reversed. These operate in conjunction with indicating lamps which light up in such circumstances.

At present there are three 1,000-KW. rotary converters in each sub-station, made by the British Thomson-Houston Co., Ltd.; they are compound-wound, with commutating poles, of the six-phase type, diametrically connected. The normal output is 1,000 KW. at 800 volts, and they can give 1,500 KW. for two hours, 2,000 KW. for 10 minutes, and 3,000 KW. momentarily. The converter transformers, made by the British Westinghouse Co., Ltd., are single-phase, rated at 375 K.V.A., oil immersed, and naturally cooled. The station and lighting transformers are of the same make and type, the former (three in number) being rated at 20 K.V.A., 20,000/440 volts, and the latter, a single unit, at 10 K.V.A., 440/110 volts. A B.T.H. motor-generator of 5 KW. gives D.C. at 110 volts, and a Tudor storage battery of 50 A.H. is provided. An air compressor, made by Messrs. Alley & McLellan, and Blackman ventilating fans, have been installed.

The rotary converters (fig. 7) are self-synchronising, and are started from tappings on the low-pressure side of the transformers by an oil-immered controller. Provision is made for coupling negative boosters to the ends of the shafts when the traffic increases to such an extent that the drop in the track rails becomes higher than desirable.

Special precautions have been taken to reduce to a minimum the flashing-over which is liable to be caused by heavy short circuits on the track. With this object the commutator cones have been covered with projecting fibre sleeves, and all earthed metal near the commutators has been painted with a composition made up of half gold size and half linseed oil. In addition, screens are fixed between the brush-holders to prevent flashing round the commutator. By these and other means, the number of flash-overs was reduced from an average of six per month during the first six months of operation to an average of two per month for succeeding months.

The transformers are mesh-connected on the high-pressure side, with tappings on the high-pressure side to compensate for variations in the supply voltage and on the low-pressure side for starting. The tanks are ¾-in. boiler plate, with external tubes to give increased cooling surface. They are mounted on rollers, so that when the core has been lifted by the overhead crane the tanks can be run out of the chamber and the core set down on a drip tray for examination. The chambers are ventilated by ducts carried up to the roof to Barrol ventilators; cooling air is drawn from outside the station by motor-driven fans, and passed round the foundations of the converters into the transformer chambers through an expanded metal opening in the door.

The auxiliary equipment of each sub-station includes a bank of three single-phase transformers, which gives a supply to the motor-generator, air compressor used for cleaning purposes, ventilating fans, and the lighting transformer. The motor-generator gives a direct-current supply at 110 volts for charging the battery used for the tripping and indicating circuits and emergency lighting.

(To be continued.)

AN ELECTRIC WORLD GIRDLE.

By EDWARD RAYMOND-BARKER.

In the article published in the *Times Trade Supplement* for September entitled "An Imperial Cable," Mr. Llewellyn Preece, M.Inst.C.E., M.I.E.E., discusses the practicability of installing and working profitably what he considers "the most economical Imperial telegraph system"—viz., "one long electric girdle round the globe."—consisting of 27,000 miles of submarine cable and 3,000 miles of landline across Canada, with an additional separate cable between India and Mauritius. This system, following an *all-red* route, Mr. Preece says, "could only be installed by the joint Governments" of the British Empire.

In reply to your kind invitation, the writer is pleased to offer the following remarks under the clear understanding that they apply solely to what he considers to be the much too superficially considered scheme as described by Mr. Preece, and not to any other well thought-out, practicable, and safeguarded project, which also does not ignore the reasonable rights and interests of the pioneer cable companies to whom the British Empire owes a debt which can never be adequately paid.

Among the reasons given by Mr. Preece for undertaking such a comprehensive and extensive system is that "the maintenance of this league will be possible only if all the principal countries are linked together on one special system of submarine cables, so that each can be in touch with all the others at all times," and that "far more personal interchange of information is requisite, and the Governments of all these countries must have at their disposal a system of telegraphic communication so reasonable in cost that all their messages shall be rapidly transmitted and immediately answered, and all occasions of misunderstanding avoided."

As to whether such a system could be installed and worked profitably at a rate of ½d. or 1d. per word for Press news, and at a flat rate of 2d. or 3d. per word for Government and private messages, Mr. Preece is of opinion that it would, because "if it were possible to supply each country daily with ample news from all the other countries the cable system would be filled with traffic throughout the 24 hours."

The capital outlay for a complete new ring should, Mr. Preece thinks, not exceed £7,000,000. "But as there is no apparent reason why the Pacific cable should not form a section of the ring, the actual expenditure should not exceed £5,000,000."

As to its proving profitable at the rates above mentioned, Mr. Preece says, "the total revenue could thus be £800,000 and the expenditure £750,000."

Now, Sirs, the object in view, viz., facilitating, cheapening, and expediting communication between Great Britain and the Dominions, is one with which every one, and more especially the mercantile fraternity of all these countries, will cordially sympathise, as, indeed, with any sound scheme which promises uninterrupted and Government-protected telegraphic service. The scheme in question is, however, so vast, and the risks of interruption so considerable, that before even seriously entertaining the idea, or advocating such a project, its practicability must, of course, be considered in all its bearings—electrical, hydrographical and

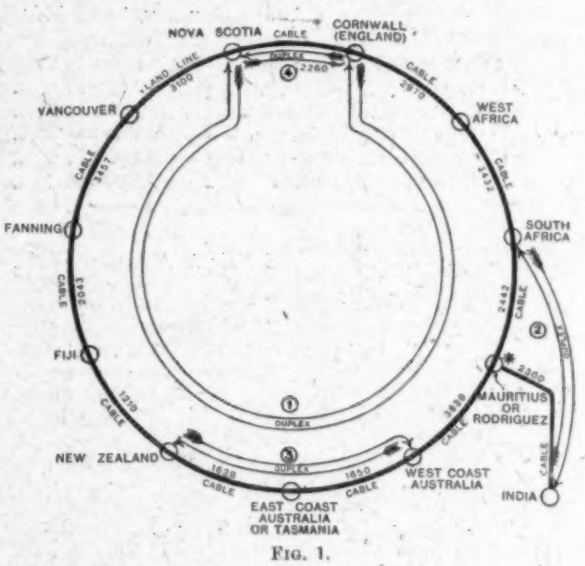

Fig. 1.

financial, by a Committee of Experts—the financial question, including traffic receipts at the suggested very low rates as against the high expenses connected with a numerous and unusually highly trained and reliable working staff, being thoroughly gone into by an expert cable company accountant.

As put forward by Mr. Preece, it will probably appear to those readers of the *Times Trade Supplement* who have no special knowledge of the subject as a thoroughly practical proposition, and, therefore, the writer would like, as a telegraphist and electrician who has for many years been occupied in the working, laying, and repairing of long submarine cables—to direct attention to certain important difficulties which, in his opinion, would prevent the success of the scheme in question being realised as fully as Mr. Preece anticipates.

As several of the criticisms refer to the practicability of the system, the writer has given the proposed cable girdle scheme in the form of a *graph* (fig.1), which enables one to appreciate at a glance the cable circuits and working routines, the details of which, without it, it is difficult to keep in the mind's eye.

"It would consist of a submarine cable starting from Nova Scotia, touching at Cornwall, West Africa, South Africa, Mauritius or Rodriguez, Western Australia, the East Coast of Australia or Tasmania, New Zealand, Fiji, Fanning Island and Vancouver. A separate cable would connect India and Mauritius, and a land-line across Canada would complete the ring from Vancouver to Nova Scotia."

As the landing points of the cables in the several countries

Press News.—Six countries. Duplex working, 50 W.P.M. each way.

Routine.	Through girdle.	Intervening relays.	Terminal stations send words.	Working duplex words.	
(1)	*England—Canada ...	8	10,000 in 3½	= 20,000 in 3½ hours	Routines (1) (2) (3) are worked in succession for 3½ hours each.
(2)	†S. Africa—India ...	10	10,000 „	= 20,000 in 3½ „	
(3)	*Australia—N. Zealand ...	8	10,000 „	= 20,000 in 3½ „	
				60,000 in 10½ „	
	Each country of the ring receives			50,000 in 10½ „	

Government and Private Messages.—Six countries, duplex working, 50 W.P.M. each way.

Routine.	Direct circuit between	Relays.	Each end of circuit sends.	Working duplex, words.	
(4)	England and Canada	1	10,000 in 3½	= 20,000 in 3½ hours	This Routine (4) is worked concurrently with Routines (1) (2) (3).
	†S. Africa „ India	1	10,000 in 3½	= 20,000 in 3½ „	
	Australia „ N. Zealand	1	10,000 in 3½	= 20,000 in 3½ „	
				= 60,000 10½ „	
				1½ „	allowed for corrections, delays, and for daily testing.
				12 „	

Government and Private Messages.—Six countries.

Routine.	Circuits.		Words.	
(5)	Canada sends to	England	1	12,000 in 2 hours	All six circuits working simultaneously.
	England „	S. Africa	1	12,000 in 2 „	
	‡S. Africa „	India	1	12,000 in 2 „	
	‡India „	Australia	1	12,000 in 2 „	
	Australia „	N. Zealand	1	12,000 in 2 „	
	N. Zealand „	Canada	2	12,000 in 2 „	
				72,000 in 2 „	

Government and Private Messages.—First three countries, working duplex, 50 W.P.M.

Routine.		Relays in circuit.	Each country sends.	Hours.	Words.	
(6)	§England—India ...	3	12,000	in 2	= 24,000 in 2 hours	These three circuits worked simultaneously.
	§India—N. Zealand...	3	12,000	in 2	= 24,000 in 2 „	
	N. Zealand—England	4	12,000	in 2	= 24,000 in 2 „	
				Total	= 72,000 in 2 „	

Second three countries, working duplex, 50 W.P.M.

		Relays in circuit.	Each country sends.	Hours.	Words.	Hours.	
(7)	Canada—S. Africa ...	3	12,000	in 2	= 24,000 in 2	„	These three circuits worked simultaneously.
	‖S. Africa—Australia...	1	12,000	in 2	= 24,000 in 2	„	
	Australia—Canada ...	4	12,000	in 2	= 24,000 in 2	„	
				Total	= 72,000 in 2	„	

Government and Private Messages.—Six countries working: Two routes available.

		Relays in circuit.	Route 1.		Route 2.			
(8)	¶ England—Australia...	6 : 3	12,000	+	12,000	= 24,000 in 2 hours	Routes (8) (9) (10) are worked in succession for two hours each.
(9)	** Canada—India ...	5 : 6	12,000	+	12,000	= 24,000 in 2 „	
(10)	¶ N. Zealand—S. Africa	6 : 3	12,000	+	12,000	= 24,000 in 2 „	
			36,000	+	36,000	= 72,000 in 6 „	

		Words.	
Government and private messages	sent through the cable girdle in 12 hours	60,000	276,000 words.
		72,000	69,000, *i.e.*, 25 %
		72,000	
		72,000	207,000
Press words	„ „ in 10½ „ = 60,000; and 50,000 received by each station.		

* As the single cable to India does not form part of the ring, it apparently can only be worked as a T-piece; so how is India to participate in the Press words coming from both end stations of the girdle at the same time?

† Mauritius can put India through to W. Australia and free end of cable to S. Africa, so that India can send Press messages through the ring; but India cannot work at the same time directly with S. Africa, as required by Routine (4).

How is the single India cable to communicate private messages (duplex)?

‡ With S. Africa and at the same time with Australia?

§ With England and at the same time with N. Zealand?

‖ Apparently the India cable must be detached at Mauritius:

¶ England can work with Australia *viâ* New Zealand, but the India cable should be detached at Mauritius to render working by New Zealand can work with S. Africa *viâ* Canada, the reverse route practicable.

** Apparently India and Canada are expected to communicate through both routes using only a single cable between India and Mauritius.

are not stated, the lengths given on the graph by the writer are in most cases the direct cable plus 10 per cent. for slack; and as they together very closely approximate the 27,000 miles of cable mentioned, they will enable the reader to appreciate the lengths to be worked through.

(*To be continued.*)

TRADE OF AUSTRALIA.

The Department of Overseas Trade has issued a report (Cd. 9,160—Price 3d.) on the Trade of Australia, prepared by H.M. Trade Commissioner in the Commonwealth. The following extracts will be of interest to the electrical and allied trades:—

Hydro-Electric Developments.—The Hydro-Electric Department of the Tasmanian Government continues to develop its undertaking, and in addition to supplying the municipal tramways at Hobart, as well as light and a certain amount of power to other users, power is being supplied to a company engaged in the extraction of metallic zinc from concentrates by the electrolytic process, as well as to a concern manufacturing carbide of calcium. Projected developments include the supply of power to a woollen mill, and to certain industries near Launceston. The demand for power appears to be in excess of the supply, owing to the difficulty experienced in getting delivery of the necessary plant. The Hydro-Electric Department has in view the development of further sources of power in the Island State, in conjunction with an irrigation scheme for intense cultivation, and one may safely predict that the activities of the Department will have a far-reaching effect on its future.

Development of Brown Coal Deposits.—In Victoria the Government has been investigating the possibility of developing the immense deposits of brown coal situated at Morwell, and other places in this State, while a local group is endeavouring to obtain from the Government a lease of certain water powers. In the Report of the Advisory Committee appointed by the Victorian Government to investigate the possibilities of brown coal, it is stated that the power generated in the Metropolitan power houses in 1908 amounted to 14,000,000 units, and that by the year 1917 this total had grown to 72,000,000 units, the average increase per annum being 20 per cent. The report adds that, assuming this rate of increase to be maintained, and allowing for the conversion to electrical traction of the cable tramways in Melbourne, it is estimated that the requirements in the year 1921 will amount to 163,000,000 units, with a maximum demand for 46,580 kw., and in the year 1925 to 341,500,000 units, with a maximum demand of 97,500 kw.

Changes in Import Trade.—A review of the figures relative to the imports of machinery suggests that, when all the circumstances are had in view, the trade has been well maintained during 1916-17. As is, perhaps, natural, there has been complaint as to delay in delivery of plant for public works and factories, with the consequent postponement of completion of the work, but, generally speaking, the position is recognised and accepted as inevitable in the circumstances. There has been a marked decline in the import of steam plant generally, particularly in that of locomotives. The practice of the Railway Commissioners in the various States is either to place orders, if possible, for locomotives with one of the several firms of local builders, or to build them in their own shops. At present, boiler plates, wheels and axles, and many other items entering into the construction of a locomotive are imported, but it seems likely that, in a future not distant, many of these parts will be made in Australia. There has also been a considerable falling-off in the imports of gas and oil engines. Many of the latter, particularly of the smaller kerosene type used on farms, are manufactured in Australia, in some cases by quite small firms. As a result, the absence of standardisation is apparent.

The market for electrical machinery and equipment of every kind is important, and certain to grow rapidly. Various schemes for the production and transmission of electrical energy are under consideration at present, but are held up owing to the war. As has been pointed out in previous reports, the United Kingdom's chief competitor in this trade is the United States, although Italy and Sweden also contribute. As regards appliances, other than machinery, Japan has made rapid progress. Recently, a Japanese firm introduced a wire-covered cable with a label attached to the coil bearing the letters "C.M.A.," the obvious inference by the uninitiated being that the firm is a member of the Cable Makers' Association. As the result of representations made by H.M. Trade Commissioner to the Department of Customs, it has been decided to regard the letters "C.M.A." or the word "Association," when unqualified, as indicating that the manufacturer of the goods is associated with the British Cable Makers' Association, and that the goods have been manufactured in accordance with the specification of that Association. It has also been decided that statements such as "Guaranteed equal in all respects to C.M.A. product of similar grade" may be used on wires and cables manufactured by non-members of the Cable Makers' Association provided that the goods are thereby correctly described. The latter part of this somewhat important decision appears to throw on the Customs Department the obligation of seeing that the goods are correctly described.

The decline in the imports of mining machinery is explained to some extent by the conditions of the industry, and by the fact that much of the mining equipment throughout the country, other than electrical, is manufactured locally. The winding engines and pumping plant on some of the mines are of local manufacture, while at Broken Hill, jigs, concentrating tables embodying the features of well-known tables of overseas origin, and tube mills, formerly made by Krupp, of Essen, are all made locally. Roll shells used in the reduction of zinc-lead ores, formerly imported from the United Kingdom and Germany, are now also made at Melbourne and Sydney. American manufacturers retain their supremacy in rock drills and coal-cutting machinery, and such competition as there is from the United Kingdom is not pronounced. Mine managers at Broken Hill state that, so far as they are aware, there is no British-made drill sharpening machine on the market.

Considerable quantities of machinery will be required almost immediately by the Electrolytic Zinc Co. of Australia, Ltd. (Risdon, near Hobart), as it is known that its successful treatment of zinciferous ores will bring in its train quite a number of subsidiary industries. The Mount Lyell Mining & Railway Co., Ltd., is also completing large works on the West Coast of Tasmania for the electrolytic treatment of its ores, and will be a large buyer of machinery for use in these directions. Similar operations also are contemplated by the Refractory Ores, Ltd., Hobart.

Local Industries.—With regard to the progress of the steel industry at Newcastle, N.S.W., which is being developed under the direction of the Broken Hill Proprietary Co., Ltd., until recently the output of these important works was largely confined to steel rails and structural material, but merchant bars are now being turned out, while a continuous rod mill imported from the United States has been erected for rolling wire rods, from which fencing and other wires will be drawn. An additional blast furnace, which will double the output of the works, has been installed, as well as a steel foundry where all the heavy castings for the new plant can be made. The equipment for producing plate for shipbuilding has been completed, and, in the opinion of the directors of the company, it should now be possible to build steamers in Australia constructed entirely of material manufactured in the Commonwealth.

At Lithgow, N.S.W., there is another firm turning out pig-iron, merchant bars, railway material, as well as pipes and tubes. A Newcastle engineering firm has recently designed and constructed an electrically-driven three-high mill for rolling merchant bars, and it is stated that the mill is running satisfactorily. The Australian Electric Steel Co., Ltd., too, is installing its second electric furnace at its works at Alexandria, near Sydney, and in view of the demand for its products, contemplates a similar installation in Western Australia in order to supply material for the mining industry. It is also proposed to erect an electric furnace in Melbourne. A firm at Castlemaine, Victoria, has taken up the manufacture of semi-Diesel crude-oil engines of the Skandia type, while oil-driven tractors for agricultural work are being manufactured by two Melbourne firms. Further, the Castlemaine firm recently completed an order for the Public Works Department of Victoria for four sets of triple-expansion marine engines and auxiliaries, with a total capacity of 1,200 I.H.P. The same firm is manufacturing electric motors up to 50 H.P.

A company, with which copper-producing interests are identified, is installing plant at Port Kembla, New South Wales, for the manufacture of copper sheet and wire.

NOTES FROM CANADA.

[FROM OUR SPECIAL CORRESPONDENT.]

A few weeks ago the final tests on the great Quebec bridge were made; heavily loaded trains, weighing in all 7,000 tons, were run on to the centre of the bridge, which stood the test satisfactorily, so that at last this great structure can now be turned over to the Government as a completed work.

A United States Government report says that the present shortage of power at Niagara Falls amounts (presumably on the American side only) to about 200,000 H.P., which could be taken up at once by existing industries if it were available. The great steam-driven plant of the Buffalo General Electric Co. is to be enlarged, and, together with additional plant being installed by another company, 62,000 H.P. more will, it is expected, be available towards the end of the year. Increases in the generating capacity of some of the hydro-electric plants at Niagara Falls will provide about 160,000 H.P. more.

An American paper, *Engineering and Contracting*, has recently suggested that electric, gas and water meters might all be read at the same time by one meter reader, and the bills for all three services posted together in one envelope. An estimated saving over present methods of $5,000,000 is believed by this paper to be a conservative one as applied to the United States.

In England, where the Corporation of a town frequently owns all three undertakings, such an arrangement should not be difficult to make.

Reference was recently made in these notes to the application of the St. Lawrence River Power Co., before the International Joint Waterways Commission, for permission to build a submerged ice weir in that channel of the St. Lawrence River which lies south of Long Sault Island. The Canadian Government opposed the scheme, and sent two representatives to Washington to see if arrangements could

not be made whereby the Governments of Canada and the United States should build the weir, and allow the company to have the use of it under licence; the deputation was unsuccessful, and the company has been given permission to build the weir, and use it for a period of five years, or the duration of the war, after which the matter must again be brought before the Commission referred to. The deciding factor in this case was the need for urgency on account of war requirements, as the company claimed that by having the weir they could generate more power during the winter months than is possible at present owing to the ice troubles which they experience, and that this would enable the Aluminium Co. of America to produce from six to seven million pounds more of aluminium per annum than they can under existing conditions.

The *Toronto Globe* argued a few days ago that the extra 10,000 or 15,000 H.P. said to be required could be furnished several times over by the Laurentide Co., or the Cedars Rapids Co., both of which are affiliated with the St. Lawrence River Power Co. This paper also publishes the following views of an hydraulic expert regarding the matter:—

"The St. Lawrence River Power Co.'s engineer stated that the dam and appurtenant works would cost $350,000. Assuming that the penstocks, turbines, and dynamos for the 114,000 H.P. made available by these works cost $1,500,000, the total cost would be $1,850,000, or a capital cost of about $16 per H.P., as compared with upwards of $75 per H.P. at that specifically favoured power site, Niagara Falls. It is a fair assumption that power is as valuable to the Aluminium Co. at Massena (New York) as at Niagara. If this be correct, and if the St. Lawrence River Co. is permitted to keep its dam at the South Sault, it has been presented with a free gift of about $6,750,000, plus whatever 114,000 H.P. is worth at Niagara. It is not an unfair assumption that the St. Lawrence Co. will make a profit of 5 cents per lb. on its aluminium. On this assumption, the product from this 114,000 H.P. will yield a profit of over $2,500,000 per annum."

The tunnel of the Canadian Railway Co. through Mount Royal at Montreal was opened a few days ago; trains are run through the tunnel by electric locomotives. Tenders are being called for by the Hydro-Electric Power Commission of Ontario on four water turbines with generators. These turbines are to be of the enormous size of 52,500 H.P. each, to be operated under a net effective head of 305 ft. at a speed of 187.5 R.P.M.; the best efficiency is to be available at 47,000 H.P., as it is expected that the turbines will normally be working at about that load. Each generator will be three-phase, 25-cycle, 12,000 volts, 43,900 K.V.A., 85 per cent. power factor; they must be capable of operating in parallel.

These huge units are intended as the first instalment of plant for the Commission's development of 300,000 H.P. at Niagara Falls. The generating station will be on the Canadian side of the Niagara River, about a mile below Queenston, but the water will be brought from beyond the Falls along the Chippewa Canal, about 13 miles in length, which is now under construction. It is unfortunate that British engineers cannot gain the necessary experience in the manufacture and operation of great hydraulic units such as those referred to, to enable them to tender for anything of that kind.

The Hydro-Electric Power Commission is also constructing a 13½-ft. pipe line in Queen Victoria Park to supply additional water to the generating plant of the Ontario Power Co.; by this means it will be possible to obtain 50,000 additional H.P. The work was only started this summer, and has been rushed as much as possible; it is expected that it will be ready about October 23rd, and, if so, it will be a great boon to South-Western Ontario, as there is a serious shortage of power in that region.

It appears that the Fuel Controller has made a demand on the City of Montreal that it should save 30,000 tons of coal this winter, and in order that this may be done the question of driving half the municipal waterworks pumping plant by electricity is being looked into.

Toronto, London, and other centres are having electric power shut off from various districts for an hour or two every day, particularly in residential parts, so that munitions factories may be kept running; all the sign and window lighting which was cut off last winter still remains off, and about half the street lights have been cut off also.

There will be a serious coal shortage in Canada this year; the supplies from the United States have been cut down appreciably by the U.S. Fuel Controller, and owing to difficulties of transportation, reduced output from the mines, and other causes, even the quantity that has been allowed is not coming in as it should. What this means in a country like this, where the temperature, even in a large city like Toronto, which is nearly as far south as Rome, can drop, as it did last winter, to 25 deg. below zero Fahrenheit, can hardly be imagined by people at home in England, who have never tried it. In many places there are hundreds, and in some cases thousands, of homes which have no coal in at all yet, and have no idea when they will get any. Under these circumstances it is not surprising that the firms manufacturing electric heaters are—well, busy, is a very mild word. Though a 1,000 or 1,500-watt heater, even in a small room, is not much use during a Canadian winter, it must be better than nothing, and may at least help to eke out a meagre coal supply.

NEW BRITISH AND KEY INDUSTRIES EXHIBITION.

(*Concluded from page* 384.)

All who are concerned with the development and improvements which have been effected by British makers in the manufacture of magnetos, and in the success which has been attained in establishing the magneto industry in Great Britain, will have been interested in seeing the display that was arranged by the British Ignition Apparatus Association. The exhibit included a complete range of magnetos for every purpose made by the British L. M. Ericsson Co., Ltd., Beeston, the British Thomson-Houston Co., Ltd., Coventry; E.I.C. Magnetos, Ltd., Birmingham; the M-L Magneto Syndicate, Ltd., Coventry; North & Sons, Ltd., Watford; Thomson-Bennett Magnetos, Ltd., Birmingham; and C. A. Vandervell & Co., Ltd., Acton. In addition, there were interesting groups of components furnished by the B.T.H. Co. and Messrs. North, as well as a set of vulcanite mouldings in various processes of manufacture by the latter firm. There was also a display of mica used in the manufacture of magnetos, and on other stands were displays of ferro-tungsten steel used for magnetos, insulating materials, &c. Messrs. Jas. Neill & Co. and Messrs. J. J. Saville & Co., Ltd., both of Sheffield, were showing specimens of permanent magnets of special interest to makers of magnetos.

The London Electric Wire Co. & Smiths, Ltd., Playhouse Yard, Golden Lane, E.C., had on view primary and secondary, H.C. copper, enamelled wire for magnetos and aircraft engines. The samples shown were of 0.08, 0.10, 0.11, 0.12, and 0.7 mm. diameter.

Messrs. Cookson & Co., Ltd., Newcastle-on-Tyne and London, were the only firm exhibiting lead and antimony. The lead was either pure and soft, for manufacturing sheet lead, lead pipes, and lead oxides, or hard, containing up to 15 per cent. of antimony for the manufacture of bullets and of accumulator grids; of course, the lead peroxide electrodes require pure lead. The antimony has a purity of 99 per cent.; the exhibits included antimony ores, oxides, and compounds. A fine display of lead oxides (red and orange) was made at King's College by this firm.

Messrs. Cuthbert Andrews, 47, Red Lion Street, High Holborn, W.C., exhibited X-ray apparatus showing the use of tungsten in target tubes. Various types of British-made X-ray tubes were shown, including a water-cooled model for use in any position, together with protective appliances such as rubber gloves, goggles, and masks.

The General Electric Co., Ltd., 67, Queen Victoria Street, E.C.—This firm's exhibits included many types, shapes, and sizes of incandescent electric lamps and parts. An "Osram Atmos" lamp filled with argon gas was also shown. Vacuum jacketed flasks, specimens of ebonite and carbons for searchlights, arc lamps, magazine flame lamps, &c., were also to be seen, and photographs of the works showing the processes of manufacture.

The British Ebonite Co., Ltd., 16, Victoria Street, S.W., was showing samples of raw rubber and sulphur, of which ebonite is composed. Samples were on view showing the use of ebonite in accumulator cases, electrical fittings, medical bottles, and in various other ways.

The British Thomson-Houston Co., Ltd., Rugby, and 83, Cannon Street, E.C.—This firm's show-case contained a Coolidge X-ray tube and a large variety of the firm's well-known types of incandescent electric lamps, with tungsten filaments. Types of magnetos for multi-cylinder engines were also shown, and a magneto distributor with the material of which it is made, showing the evolution of a distributor made of moulded insulating materials. Photographs illustrating the assembling of magnetos were also exhibited.

The Morgan Crucible Co., Ltd., Battersea Works, Church Road, S.W.—Amongst these exhibits were crucibles for melting steel, brass, bronze, and metal alloys, as well as foundry facings, a selection of carbon brushes, and lubricants. A chart showing the various uses to which graphite is applied was also shown. Some of the graphite crucibles of various shapes and sizes up to nearly 5 ft. on view are for direct electric heating, the crucible serving both as container and resistor. The one shown is of vase shape, and is provided with suitable extension pieces both at the top and bottom; these pieces are encircled by the ring electrodes through which the cooling water circulates. A small crucible of the form shown would take 150 lb. of metal, but crucibles for charges up to 1,000 lb. have been made. In the tubular crucibles the ring electrodes are placed round the thickened extremities of the tube; such crucibles are used also for the reduction of oxides and gas reactions.

An important application of tungsten is for the production of tungsten steel employed in the construction of magnets for aeroplane magnetos and high-speed tools. A less known, but equally important, application illustrated at the exhibition was as a substitute for platinum and its alloys. In wireless telegraph instruments, magnetos, and various electrical appliances, tungsten parts are used, it is stated, at one-tenth the cost of platinum with even better technical results. Combined with sodium, tungsten compounds are largely employed for impregnating fibres to render them fireproof, and as a mordant in dyeing. Messrs. Duram, Ltd., Thanet House,

231, Strand, W.C., were one of several firms exhibiting specimens of tungsten ore and molybdenum ore, with specimens of finished and partly finished products of these metals, showing the various stages through which they pass.

The exhibition was due to close on October 22nd, but at the request of the Board of Trade it remained open until yesterday, to enable the Greek Minister of Agriculture and the influential party representing Greek commercial interests, which is now touring the leading industrial centres of the United Kingdom, to pay it a visit.

On Wednesday afternoon, last week, Mr. W. M. Hughes, Prime Minister of Australia, delivered an address, in which he said the exhibition should bring home to the people of this country how near we had been to handing over the possession of the raw materials of the Empire to the enemy. He advocated no economic war, but with our friends we would be friends, and enemies with our enemies till they had paid the full penalty for their crimes.

The exhibition was well patronised by the public, the daily attendance averaging about 5,000 visitors.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Technical Publicity.

Mr. Birkett's homilectical remarks in the article appearing last week are very pertinent, and deserve, if not to be "read, learnt, and inwardly digested," at least to be duly cogitated upon.

Mr. Birkett's remarks ought certainly to carry weight, as he is specially qualified to speak on this matter of advertising, as he has viewed it all round in rote, as buyer, seller, manufacturer, and sympathetic onlooker, and, too, with artistic qualifications, though these, as becomes an engineer, he discreetly submerges.

But the point in his article I should like to support is his suggestion as to the newer publicity taking the form of distributing the latest information. It certainly seems regrettable that so little is at present to be gained in turning over the pages of usual technical advertisements. Mr. Birkett's suggestion that "information" should be conveyed through the advertisement columns of the trade journals, would, if adopted, relieve the aridity of these pages, and in some measure at least, stimulate an interest in the firm, thus relieving the monotony, a first step, even if a small one (according to advertising psychology), towards the conversion of the reader into a buyer.

T. W. Cole.

London, S.W., *October 16th*, 1918.

I have read with pleasure the interesting articles and correspondence published in the last three issues of the Electrical Review, and hope you will kindly insert the following remarks with regard to advertising in foreign countries:—

It is evident that if a business man is interested at all in foreign markets, he cannot afford to entrust his translations to persons whose knowledge of the required language is at best general, and who have to hunt up the technicalities in dictionaries. Dictionaries, like explosives, must be handled with judgment. A word may be rendered in different ways, and if the translator is ignorant of the subject, the expression that *seems* correct to him may be quite misleading to others. Hundreds of translators are every day writing "voltage," "ohm," "dynamo," "booster," "balancer," &c., who would be quite nonplussed if they were asked to tell, for instance, the difference between "ohm" and "volt." They are in bondage to the dictionary. Men under such bondage cannot depart one comma from the text. They cannot frame successful appeals.

It is well to remember that psychology also counts. It is wrong to assume that even a verbally correct translation constitutes a good piece of advertising. Take, for instance, the Latin-American buyer. He is a rapid, nervous type of man. "He thinks in flashes." He hates detail. Illustrations followed by terse explanations of salient features will be sure to interest and please him.

If any of my readers has a Latin-American friend, let him watch him while he is buying. Perhaps it is a new tie. The style and colour appeal to him. He does not want to hear the salesman expatiate upon the beauty and choiceness of his wares. Neither does he want to haggle over the price. He wants to pay, and perhaps wear his tie on the spot! Englishmen are less impulsive buyers. They take time to "think it over." They are interested in the details, and like as much information as they can possibly secure. They are of a more "philosophical" type.

Thus, successful translation involves adaptation of what appeals to one type of buyer so that it may appeal with equal force to a different type of buyer.

Maximiliano Attias.

London, W.C. 2, *October 18th*, 1918.

The Coal Crisis.

It is now universally realised among business men that only the most rigid economy on the part of all users of coal will stave off a perhaps serious shortage, which shortage, of course, would affect public utility undertakings.

The section which least realises the importance of economy is perhaps the public, and the Coal Controller is doing all he can to drive the truth home. In order to assist in this endeavour, my committee is asking its member companies to help in the distribution of a circular on coal economy, got out by the Coal Controller. They would enclose this with their correspondence, accounts, &c., and the batch of circulars would be delivered post free to the undertakings.

As every little helps, I put forward as a suggestion that other sections of the supply industry might perhaps offer similar assistance.

T. W. Cole,
Secretary,
The Provincial Electric Supply Committee of the United Kingdom.

London, E.C., *October 22nd*, 1918.

Commercial Bribery.

You state that German firms were most strict in regard to bribery at home, though they never hesitated to employ corruption to any extent outside the Fatherland.

This is borne out by the fact that influential Germans, as usual quick to copy others, formed an anti-bribery association on the lines of this League—we had a conference in Berlin in 1912!—and in a short space of time this had a huge membership, and instituted a large number of prosecutions.

The Secretary,
Bribery and Secret Commissions Prevention League, Inc.

London, E.C. 4, *October 16th*, 1918.

Foreign Competition.

A great public service was rendered by the secretary of the C.M.A. by publishing in the Review of September 13th the cutting from another paper, of an article with reference to Falk, Stadelmann & Co., headed, "How to Become British."

From Mr. Asquith's statement recently, affirming still his adherence to Free Trade, we appear to have little hope of Government assistance in protecting our vital industry from after-war foreign competition, and few trades have suffered more in the past, as you know, than ours.

Cannot you, Sir, supplement this letter by publishing in the Review a complete list of all electrical firms supported by foreign capital still in existence in this country? In view of the prospects of an early peace, such information would be of the greatest value to hundreds of your readers, and presumably it would be difficult, if not impossible, to publish such a statement after peace is declared.

J. Farr.
(J. Farr & Co., Ltd.)

Nottingham, *October 20th*, 1918.

[A printed official list of enemy businesses ordered to be wound up is obtainable from H.M. Stationery Office. Inquiries respecting businesses concerning which correspondents are in doubt should be addressed to the Department of the Board of Trade dealing with the matter. The policy of the Board has been settled by Acts of Parliament, and it is for the Board to decide whether or not a business may be continued. As already stated, we cannot undertake a detailed investigation and analysis of all the firms connected with the industry, nor is the trustworthy information at our command sufficient for such a purpose. We would suggest that our correspondent, and others who have made similar proposals, should avail themselves of the information which their trade associations have facilities for collecting.—Eds. Elec. Rev.]

The Electrical Power Engineers' Association.

While I feel that the columns of your journal need not have been used by Mr. Vincent to communicate with me, I will answer briefly the queries of his letter in your last issue, and will be glad to reply to him further if he will communicate with me, as under:—

1. Yes.
2. By the staff engineers engaged in the generation and distribution of electricity throughout the United Kingdom.
3 and 4. As a protective association to safeguard the interests of staff engineers in this section of the electrical industry.

While we regret its misgivings, we venture to disagree with the Marylebone branch of the Union of which Mr. Vincent is secretary.

Staff engineers cannot admit that their interests would be adequately protected by his Union, or his rival unions, in the same way that a medical man would feel averse to leaving his professional concerns to the chemist or to the competent man who drives his car.

W. Arthur Jones,
Hon. Sec., E.P.E.A.

37, Wallwood Road, Leytonstone, E. 11.
October 21st, 1918.

The Bonus System as Applied to Sub-Stations.

We hear from time to time of the bonus system being successfully applied to large power stations, but very little has been said as to the possibility of applying it to sub-stations, although in most large power stations every unit which they generate has to pass through a sub before it is finally distributed.

The bonus system applied to car driving has just resulted in the drivers and conductors on the L.C.C. tramways receiving their first allocation.

At first sight, it would appear that there was very little scope for the saving of power in a sub, but on further reflection, one comes to the conclusion that those in charge of a sub can materially affect the efficiency in the ratio of their success in the manipulation of the plant.

The efficiency may be raised either by reducing the "machine hours," or by reducing the "station hours," the latter reduction being obtained by interlinking with other stations, at light loads.

To reduce the machine hours, a careful watch of the load is necessary, so that machines can be started up or switched out to meet the varying demands.

The type and capacity of the machines have a certain influence on the result. For instance, where it be possible a rotary converter should be run, instead of a motor-generator of similar capacity, when the load is a light one. A careless operator may leave a machine running much longer than necessary, through having his attention diverted to something other than his recognised duties.

If two curves were plotted, one giving the capacity of the running machines, and the other the units generated as registered on the integrating wattmeter, say, every quarter of an hour, one would at once see where it would be possible to economise. For the basis of calculation, the combined mean efficiency of all the sub-stations over a certain equivalent period could be used.

During these times, when it is so important to save every ounce of coal, the application of the bonus system to sub-stations is worthy of consideration, and would result in a substantial gain to the employé, employer, and country.

F. W. T.

October 19th, 1918.

"Fraternity"—or Tyranny?

I have been a constant reader of the Electrical Review now for more years than I care to remember, but certainly think the current week's issue the best number that up to date has seen the light. But it is putting a great strain upon your readers to have to search from page to page for the fun and jokes, and would respectfully suggest you have a separate page on the same lines as all first-class journals and periodicals—The Women's Page, by Dolly Daydream; The Cosy Corner, by Lady Cornelius Vere de Vere; Knotty Brain Waves, by Professor Horatio Bottomley, &c., &c., and place same under the directorship of Mr. J. Shaw. A page with the following articles would draw the crowd: "Why an ardent Trade Unionist employs Non-Unionists," by J. "Gilbertian" Shaw; "Causes and Leaders" (lost and otherwise), by the Editor; "How they got into the Wrong Room," by Sir G. Gibb; "The Mutterings, Utterings and Writings of the Kaiser," by Wilhelm; "How we Wound up the A.E.S.E.," by W. J. Ebben; "Amalgamation, Past, Present, and Future," by W. Arthur Jones; "How we got Something for Nothing," by Members of the E.P.E.A.; "Advice," by C. H. Wordingham.

Paper may be very scarce and also dear, but for goodness sake, Mr. Editor, please put in all that Mr. Shaw sends you. Good laughs these times are worth anything.

Mr. Shaw's letter I certainly shall not attempt to answer (not believing in painting the lily), except to sincerely trust he will not carry out his threat of reporting me to *John Bull*; if he does that, I am for ever damned.

Your leaderette, Mr. Editor, deserves a few remarks, however. The feeling that exists between the Electrical Trades Union and the E.P.E.A. will, I am afraid, continue to exist as long as the objects of the E.P.E.A. are as stated by Mr. Atkinson before Sir George Gibb. He said, "We came here on the invitation of certain representatives of *this side* (the employers' side), to contest the claim of the Electrical Trades Union to represent the staff engineers." My only remark is, that is the sort of statement one would expect to be made by the representative of a "trade union" such as the E.P.E.A.

One paragraph of your leaderette reads as follows: "The threat of the E.T.U. secretary, therefore, is utterly indefensible and unworthy of a free man, and will do far more harm to his own cause than to that of the E.P.E.A." But I though, Mr. Editor, the causes of all trade unions were the same, at any rate the cause of the Electrical Trade Union is the uplifting and bettering the material conditions of the workers in the electrical industry, and we are doing it fairly successfully. For confirmation, ask any member of the E.P.E.A. what the cause is, and why the cause for the E.P.E.A., should be stated by a member of that body; personally fear the law of libel.

Feel sure, Mr. Editor, that now you have drawn the attention of the members of the E.T.U. to their poor leader, I shall be getting the sack, and shall have to apply for employment to Mr. Shaw.

Whether the letter I sent one of our renegades was justified is a matter of opinion, whether the purport of it will be carried out is—well, wait and see.

W. J. Webb.

London, E.C. 1, *October 21st*, 1918.

[We think that Mr. Webb's objection to the remark attributed to Mr. Atkinson is well taken; but we do not agree that he is right in adopting that one remark as a criterion of the objects of the E.P.E.A., which have been fully set forth in our pages (see June 7th, 1918, p. 544), and which do not contain a single feature to which the E.T.U. could take exception, so far as we can see.

As regards our own remarks, Mr. Webb begs the question; we said his threat was "utterly indefensible and unworthy of a free man," and that is true; we are not concerned to argue about the causes of trade unions or any other red herring that he may drag across the track—to deprive, or endeavour to deprive, a fellow-citizen of his means of livelihood, on any pretext whatever, is a criminal act.—Eds. Elec. Rev.]

I think the enclosed letter is a sufficient answer to W. A. Jones, General Secretary, E.P.E.A., on "Fraternity"—or Tyranny? in your issue of October 11th.

R. Wadman,
Fulham Branch E.T.U.

London, S.W. 6, *October 16th*, 1918.

From the *Electrical Trades Journal*, September, 1918:—

The following is a copy of a most illuminating letter and throws considerable light on the means that are being adopted in certain quarters to discredit the E.T.U.:—

[COPY.]

Beechgrove, Ridgeway Road,
Redhill, Surrey,
June 24th, 1918.

John Whitehead, Esq.,
Admiralty Hostel,
63, Hamilton Square, Birkenhead.

My Dear Sir,—The secretary has handed me your letter of the 22nd inst., but, unfortunately, it has come into my hands too late for my reply to reach you by the time you named. I would reply to your questions as follows:—

1. On no account whatever join the E.T.U. By doing so you declare yourself to be a workman instead of an engineer.
2. You are under no obligation to join the E.T.U., though I suppose individual employers have a right to say they will only employ union men.
3. Joining the E.T.U. will not affect your membership of the Institution, though it is most undesirable that members should so lower their status.
4. A member of the I.E.E. *can* be a member of the E.T.U.

Under existing conditions it is most desirable for every worker to belong to a protective organisation, and the I.E.E. is at present busily engaged in seeing to it that such an organisation suited to the standing of its members is available. At the present moment I should strongly advise you at once to join the Electrical Power Engineers' Association, if they consider you eligible; if not, they will hand you over to a similar organisation dealing with manufacturers' staffs. Either of these associations you can join without loss of status and be as well protected and recognised as an organised worker as if you were in the E.T.U. If I can assist you with any further advice do not hesitate to let me know.

Yours truly,
(Signed) C. H. Wordingham,
President, Institution of Electrical Engineers.

WAR ITEMS.

Exports to China.—A further list of those in China to whom exports may be consigned appears in the *London Gazette* for October 18th.

Trading with the Enemy.—The "London Gazette" for October 18th contains further lists of persons and bodies in the following countries with whom trading is prohibited:—Cuba, Netherlands, Netherlands East Indies, Fernando Po, Spain, Sweden, and Venezuela.

The £5 Minimum Claim.—The award of the Committee on Production on the demand for a minimum rate of £5 a week for shipwrights in the Clyde, Barrow, Aberdeen, Dundee, and Leith districts has been issued, and the men's claim is not conceded. It appears to the committee that any award made at the present juncture would be to the prejudice of an independent and impartial hearing of the case with respect to the whole shipbuilding trade by the committee, which was fixed for October 24th.

Tramway Workers' Wages, &c.—According to the Manchester *Daily Dispatch*, the tramway workers throughout the country have put in still another application for an increase of pay. This is for the bonus of the men to be extended from 25s. to 35s., and that for women from 18s. to 35s. Half the bonus is asked for on behalf of boys and girls under 18. The agitation is part of the scheme for obtaining equal pay for women as for men where the same work is performed.

When the War Ends: Munitions Contracts.—In the House of Commons last week, according to the *Times*, Mr. G. Terrell asked whether, in view of the possibility of an early peace, any committee had been appointed with authority to wind up contracts for the manufacture of munitions of war and to award compensation, and what arrangements had been made to find employment for workpeople now engaged on war work in munition factories. In reply Mr. Bonar Law said that these matters had been long under the consideration of the Government, but it was not possible at present to make a statement about them.

National Industrial Unity after the War.—Writing in the Manchester *Daily Dispatch* on "Affluence or Poverty After the War," Mr. H. Dubery, General Secretary of the Federation of Post Office Supervising Engineers, urges that for the few years following the war every means should be taken to create the best relationship between the progressive and broad-minded employer and the constructive and evolutionary trade unionist. "They must co-operate for the reconstruction of the social system on broad and sane lines. While retaining the weapons of the strike and the lock-out, they must be chary of using them. It is not enough to offer to the industrial world a machine such as Whitley Committees; nor will it improve matters if such machinery is put under the control, advice, or benevolent patronage of the bureaucrats of a Government department. This may be good as far as it goes, but the real need is a satisfactory atmosphere in which employers and workmen who put principle before profit, and national well-being in front of personal aggrandisement, can work together against all disruptive and enervating forces, whether they arise through a soulless bureaucracy, extremist agitation, or a brutal economic system. It is the duty of right-minded men and women in every walk of life to strive to attain in the near future this spirit of national unity."

The Demand for Manufactures after the War.—In the course of an article on "Munition Shops After the War," in the Manchester *Sunday Chronicle*, "Observer" predicts for this country an era of prosperity for at least twenty years, unknown in previous history. The writer gives the following reasons for his optimism:—

"All the world is starving for manufactured articles of all descriptions to be used in peaceful avocations. During the last four years the sole industry of the world, and particularly of this country, for instance, has been war. Coal, iron, steel, cotton, wool, chemicals, the basic materials of all industry—yea, even the land itself—have been used solely for the making of instruments of destruction, and every minute used, every ounce of energy expended, and every penny spent has been so much capital lost to the world. It will have to be made up, and made up by increased energy and production. Take as an example the electrical trade. Before the war Germany exported £15,000,000 worth of electrical plant and apparatus annually, England £5,000,000 (apart from telegraph material), America £5,000,000, Sweden £5,000,000, and Switzerland roughly £5,000,000, a total of £30,000,000. For four years these exports have ceased. This means that, without allowing for the increased demand for electrical plant, there is £120,000,000 worth of leeway to make up, not taking anything into account for the depreciation of the machinery already in existence, which has been working at full pressure the whole time. Not a single firm that is now making electrical stuff for the war will have to close down. On the contrary, if anything they will have considerably to extend their premises and engage more hands. No industry has been so much pushed along by the war as the electrical industry. We can as a result (and shall continue to) beat Germany. Those works now making electrical engines of all kinds for aeroplanes, motors, submarines, and cruisers will be able to make water turbines, steam turbines, generating plant, magnetos, motors, cables, and heating and cooking appliances. We can now make magnetos as good as the Germans, which we could not do before the war. I make bold to say, too, that every ordinary engineering shop in this country has sufficient orders on its books to provide work for at least 10 years."

The writer of the article considers that the standard of living of the working classes will not go down, but will indeed go higher and higher, and that wages instead of decreasing will increase!

Exemption Applications.—A tramcar conductor, in the employ of the Burnley Corporation, aged 43, was given exemption to the end of January.

At Kidderminster, on the appeal of the Tramway Co., exemption until March 31st was granted to E. Turner (38, Grade 1), foreman; J. Whitmore (31, Grade 2), motor man; and S. Edwards (24, Grade 3), general clerk.

The Bexley Heath Tribunal has granted six months' exemption to R. Dennett (35), motor man on the U.D.C. tramways.

At Oxford, Messrs. J. E. Elliott & Co., electrical engineers, appealed for their manager, C. J. Manley (50, Grade 1), and it was stated that all the three men were either employed by the Government or were in the Army. Three months were conceded.

At Broadstairs, the Isle of Thanet Tramway Co. appealed for a truck fitter, and it was stated that owing to business pressure he was putting in 80 hours per week. He was exempted and excused the Volunteer service.

St. Albans Tribunal has granted six months' exemption, subject to substitution, to J. W. Allen (45, Grade 2), electrical fitter with Messrs. Nicholson, Ltd.

LEGAL.

A.E.G. Electric Co., Ltd.

In the Chancery Division, on October 17th, Mr. Justice Younger made an order for the winding up, under the Trading with the Enemy (Amendment) Act, 1916, of A.E.G. Electric Co., Ltd., on a petition by the Board of Trade.

Mr. Austen-Cartmell said this was the last survivor of the group formed by the A.E.G., Berlin. There had been complicated arbitration proceedings with the Rio Tinto Co., and when the matter was before his Lordship last sittings it was thought by the company that an order for winding up might embarrass it in those proceedings. Now the points of fact had been dealt with by the Arbitrator and the points of law by the Official Referee, and their decisions had been given. So far as the arbitration was concerned, therefore, there could be no objection to the order he asked for.

His Lordship: Is there an appeal from that award?

Mr. Austen-Cartmell: Not yet. Counsel, continuing, said his Lordship on the former occasion was quite satisfied that the case was one in which a winding-up order should be made, and only allowed the matter to stand over on the application of the company's counsel, on the ground of possible embarrassment over the arbitration. The Board of Trade felt that, now that the decisions in the arbitration proceedings had been given, there would be no harm done to the company by a winding-up order. But he asked for two indulgences under the new Act—the appointment of the controller, who was seized of the whole matter, as liquidator, and to dispense with the meetings of creditors and contributories, and with the usual statement of affairs, under Sec. 152.

Mr. Stuart Bevan, who appeared for the Rio Tinto Co., said, apart from the question of the arbitration, the litigation between the company and his clients was not at an end. All that had to be found in these proceedings was what was the amount of damages to which the Rio Tinto Co. was entitled. But the Rio Tinto Co. was plaintiff in an action against the company, in which it was claiming a large sum of money.

Mr. Austen-Cartmell said it looked as though about £7,000 would eventually be found due to the Rio Tinto Co., and the winding-up order would not prejudice that. At the previous hearing, Mr. Conway was instructed by the company to express the view that a winding-up order before the award in the arbitration proceedings might conceivably embarrass it, and he (counsel) agreed.

His Lordship said he was not sure that the Rio Tinto would not be safer under a winding up.

Mr. Bateman, for the A.E.G. Electric Co., Ltd. said he had a list of salaries now being paid to employés of the company, at its request, and with the consent, of the Board of Trade. These would automatically cease upon the appointment of a liquidator. It was desired that these payments should be continued.

His Lordship said so long as the liquidator was satisfied that the funds in his hands were sufficient to meet all prior claims there would be no difficulty over that point.

Mr. Austen-Cartmell: There are large surplus assets in any case now, and there has been assent to this on the part of the German owners.

His Lordship said in the cases that had come before him there had been no reluctance on the part of the German owners to continue these payments under similar circumstances.

Eventually the Court made the order for the winding up of the A.E.G. Electric Co., Ltd., and gave the Rio Tinto Co. leave to continue its proceedings against the company.

In the King's Bench Divisional Court on October 22nd an application was made to extend the time for appeal in the matter of the arbitration proceedings between the A.E.G. Electric Co., Ltd., and the Rio Tinto Co., and the Court granted three weeks.

Elliston, Evans & Jackson, Ltd., v. Lynedocks Wood Turnery and Twisting Mills.

In the Shoreditch County Court, before his Honour Judge Cluer, plaintiffs, electrical and mechanical engineers, of 13, Cross Street, E.C., sued defendants, of Lynedock Street, Kingsland-road, wood sawyers and turners, to recover £16 for the supply of an electric motor for driving the machinery at the latter's saw mills. The defence was that the motor would not work, that the defendant had lost a considerable sum of money owing to his inability to use the machinery, and he did not consider he was called upon to pay for it. The plaintiffs said an electric motor was supplied costing £30, and the materials for fixing it £6. They had only received £20 on account.

Defendant: They tried to palm me off with a motor that will not go, putting me to a lot of expense.

Judge Cluer: That is no answer to the claim; you must counter-claim for any damage. Have you had the electric motor and do you owe for it, is all that is before the Court.

Defendant: Oh, yes, I had the motor, but I think I can prove that I have lost £25 in lost time, and thereby cannot pay for it.

Judge Cluer: That might or might not be the subject of a counter-claim, but it is no answer to this claim.

Defendant: It has taken me five months to put it right, and I have been losing money all the time.

Judge Cluer gave judgment for the plaintiffs for the amount claimed, and ordered it to be paid at £2 a month.

BUSINESS NOTES.

Regulations Respecting Machine Tool Orders.—It is not generally understood that orders for machine tools for work, other than war work, may now be placed with manufacturers, merchants, and importers without submission to the Ministry of Munitions for approval. While the Ministry of Munitions has notified traders that they may place such orders on their books, they are not permitted to manufacture or supply until the present restrictions are withdrawn. For the time being, therefore, no machine tools may be manufactured except for the purpose of satisfying definite munitions orders approved by the Machine Tool Department of the Ministry of Munitions, or in accordance with manufacturing programmes also sanctioned by that Department.

The Minister of Munitions gives notice that all applications for a permit to purchase or enter into negotiations for the purchase of machine tools, power-driven wood-working machinery, or treadle lathes of 3-in. centres or over, suitable for use in cutting and working metal, or suitable for use in cutting, working, or operating on wood, under the above-mentioned orders, must be made to the Controller, Machine Tool Department (T.M.7), Ministry of Munitions, Charing Cross Buildings, Embankment. London, W.C. 2.

Australian Electrical Contracting.—We have received a copy of the annual report of the Electrical Traders' and Contractors' Association of Victoria. It shows that during the period ended April, 1918, the trade had been well maintained, in spite of the war. Restriction of imports from Great Britain, &c., caused serious misgivings early in the year, but the means for maintaining the industry had been, in a small measure, due to the large importations of electric wiring accessories from Japan. As a temporary source of relief this had been greatly appreciated, but it was to be hoped that, after Peace had been declared, the true British spirit would cause them to give every consideration to the Mother Country in the Commercial struggle. The war had strengthened and developed in Australia the manufacture of electrical apparatus and some lines of accessories. They hoped that this would not be a passing change, but would continue to be developed in the interests of those firms who had come forward to fill the gaps. The Association wished these new industries every success, and hoped that they would long continue to be a valuable asset to that part of the Empire financially. The Association has formed itself into two Sections—one dealing with trading matters and the other with wiring contracts and workshop work. The report states that satisfactory progress has been made with the standardisation of wiring rules. There is now throughout Australia only one set of wiring rules and regulations for the installation of electrical apparatus which is honoured by supply companies and fire insurance companies alike, and is in the care, as regards alterations and interpretations, of Standing Committees in New South Wales and Victoria. As the result of the proposed Municipal Trading Bill not having become law, members' interests were still conserved in what they considered their legitimate sphere, unassailed by competition from municipal bodies. The Council was in constant communication with the Electrical Contractors' Association in London in connection with any measure of that nature which might be brought before the British Parliament. The Association has dealt with the question of false trade descriptions (Japanese importations), and the Customs authorities have guaranteed the protection of British trade marks against such infringements. Mr. G. L. Just is president of the Association, and the address of the Secretaries is:—Fell, Rankin, Morrison & Co., 314, Collins Street, Melbourne.

Calcium Carbide in Japan.—According to the *Revue Générale de l'Electricité*, calcium carbide was first made on a small scale in Japan in 1901. As the demand increased, the manufacturing facilities were developed, and two of the factories are able to produce respectively 30,000 and 5,000 tons per annum of carbide, which is converted into cyanamide, and used for the manufacture of sulphate of ammonia. The increased production has enabled Japan to export carbide to Australia, the Philippines, Java, and India.

The Importance of Export Trade Development.—In the course of an address on "Present Aspects of Trade," Sir Albert Stanley, M.P., President of the Board of Trade, told the Bradford Textile Society that the demand of the workers for higher wages and better conditions could only be met by improved export trade.

Anglo-Italian Trade.—According to a daily paper, Mr. Victor Fisher has resigned the secretaryship of the British Workers' League, and is on his way to Italy on an "official mission" for promoting industrial and commercial unity between Great Britain and Italy.

The Importance of Advertising in War-time.—The American *Electrical Review* quotes the following statement recently issued by the Hon. W. B. Colver, chairman of the U.S. Federal Trade Commission, on the importance of maintaining trade advertising during the war:—

"Discontinuance or even sharp curtailment of advertising, because of temporary war conditions, would seem to imperil the most valuable asset that any business has—namely, its goodwill. No more faulty logic can be found than that which would impel a manufacturer to cease building for the future by means of advertising, simply because the output of his factory is, for the time being, restricted; or because diversion of his facilities to war-work has operated to withhold his goods from the accustomed markets. In modern business there can be no 'sufficient-unto-the-day' policy.

"In advertising, the business man has built up the intangible or spiritual side of his business, if such it may be designated, as distinct from the material side. It is the spiritual side as represented by the goodwill, that is slower of growth and that is the more seriously jeopardised by neglect—neglect which could take no more disastrous form than an interruption to advertising.

"Goodwill, in my estimation, is far more valuable than the physical property with which it is linked.

"The manufacturer who has converted his factory to war-work, and has, therefore, interrupted the production of his original line, does not tear down and discard his expensive machinery to save the insurance premiums or other similar expenses. It would be just as sensible for a manufacturer whose commercial integrity is founded upon advertising to abandon his advertising campaign in order to save the carrying-charge upon his greatest asset—goodwill.

"They told me when I was a youngster that even the Lord can't make a two-year-old calf in a minute. Big advertising spreads after the war will meet equally big spreads. Business will bid for public attention and interest on a bull market. The purpose will be to put a punch in goodwill which has gone flabby. The man who goes into that contest with a public attention and interest which he has never allowed to relax will go in with his goodwill trained to the minute.

"He will win."

Catalogues.—The New Switchgear Construction Co., Ltd., Wellesley Road, Sutton, Surrey.—Twenty-eight-page provisional catalogue and price list (No. 70), in English and French, containing fully illustrated description, tabulated prices, weights, &c., of the company's oil-break switches and switchgear.

The Industrial Situation in China.—It appears from a brief dispatch received from the *Times* correspondent at Peking, that while the educational needs of China are great, the industrial needs are greater. Engineering and industrial students returning from abroad are stated to be unable to find positions for which they are trained.

Neutral Trade Marks.—The *Daily Mail* learns that Germans are buying up well-known trade-marks in neutral countries, especially Sweden, Norway, and Denmark. "Certain established hardware specialities, now sold abroad as Scandinavian wares, are said already to have come under German control! The object of this manœuvre, of course, is to fool people into thinking that they are purchasing products of the countries in question, instead of goods actually manufactured by Germany. The same trick, it is reliably reported, is also being tried with regard to American trade-marks."

Book Notices.—*The Synchroscope.* September, 1918. A monthly publication by the Detroit Edison Co. in the interest of its employés. The number to hand contains an article by C. R. Cross on "The Connors Creek Power-Plant Piping," a list of Edison men in the war, and a number of interesting notes and notices.

Bureau of Standards, Circular No. 73, entitled "Copper," deals primarily with the physical properties of pure and commercial grades of copper. The best data and values are given for the various physical characteristics and constants, together with a bibliography of the sources from which these values were taken. The effect of impurities upon the properties of copper is discussed, as well as the influence of various factors in its manufacture. The circular contains over 100 pages, and is the most complete treatise on the subject that we have seen; it is freely illustrated with half-tones and graphs, and treats of every aspect of the subject more or less exhaustively, forming an invaluable store of information in a convenient form. Those interested may obtain a copy by addressing a request to the Bureau.

"*Proceedings* of the Physical Society of London." Vol. XXX, Part 5. August 15th, 1918. London: Fleetway Press, Ltd. Price 4s. net.

"*Journal* of the U.S. Artillery." Vol. XLIX, No. 3. May-August, 1918. Virginia: Coast Artillery School Press, Fort Monroe. Price $0·50.

"Post Office Electrical Engineers' Journal." Vol. II, Part 3. October, 1918. London: H. Alabaster, Gatehouse & Kempe. Price 1s. net.

Bankruptcy Proceedings.—E. C. Sparkes, electrical and manufacturer's agent, 118, Wardour Street, London.—Receiving order made October 17th, on a creditor's petition. First meeting, October 30th; public examination, December 3rd.

Australia.—A Conference of the engineers of the larger electric supply stations, which was convened by the Government, has agreed that power stations shall pool their requirements, so that orders in bulk may be sent to Great Britain, and delivery thereby facilitated.—*Australian Industrial and Mining Standard.*

Trade Announcement.—Messrs. Witton James, Ltd., have removed to the Hyde Electrical Works, Colindale Avenue, Hendon, N.W. 9. Telegrams: "Varishunt, Hyde, London." Telephone: Kingsbury, 280. New offices and commodious works premises have been taken, and the address of the registered office is as stated. The works are of ample proportion for immediate requirements, and the company has taken adjoining land for extensions. In future all its various specialities will be manufactured there.

VERITYS LTD

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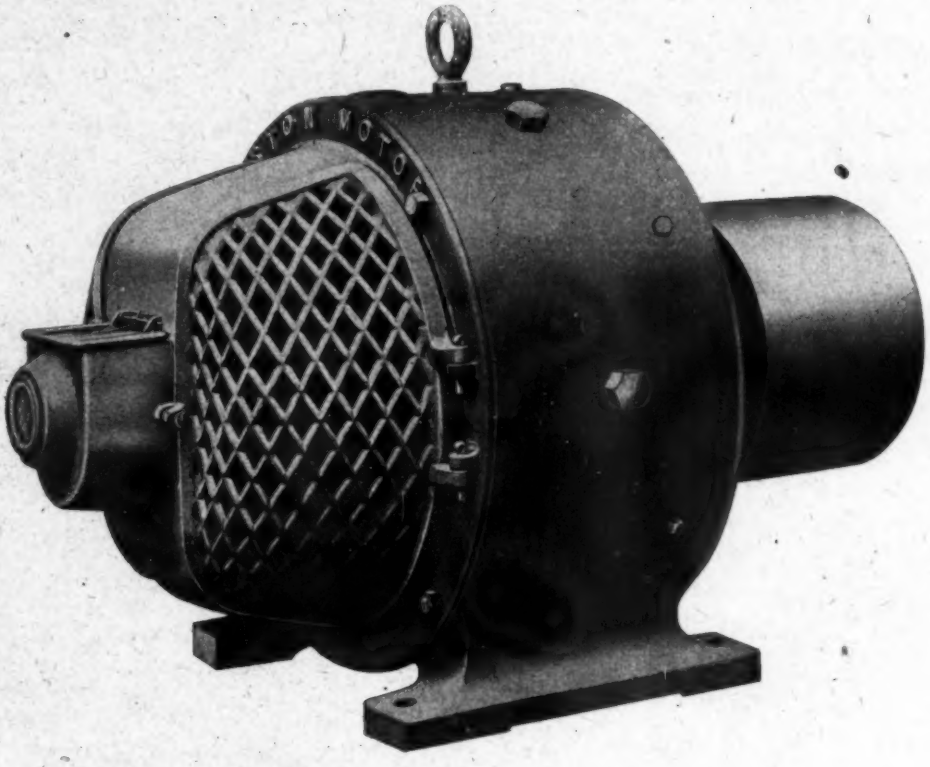
WORKS: ASTON, BIRMINGHAM.



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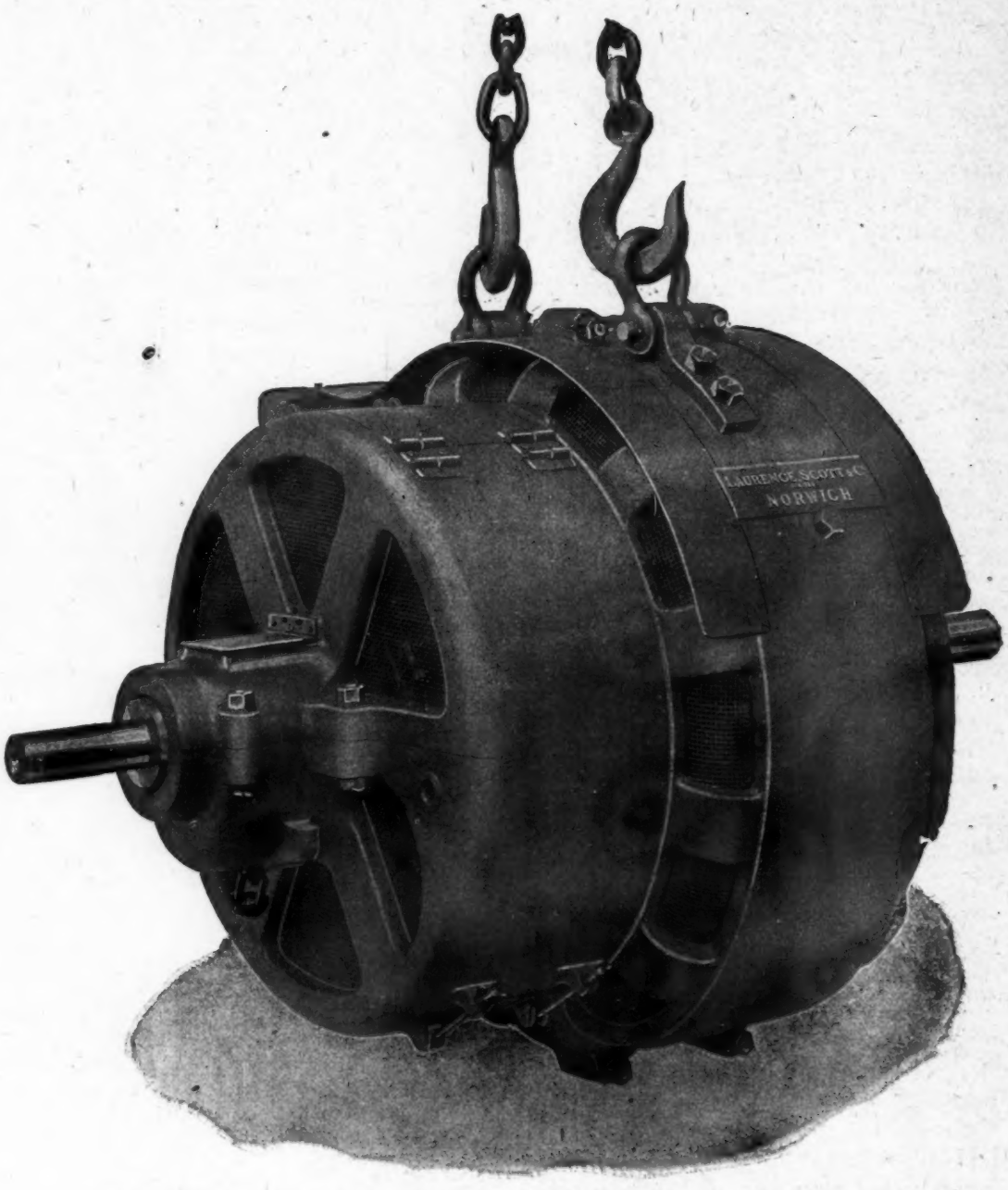
LIVERPOOL: 518, Royal Liver Buildings.

M. 119



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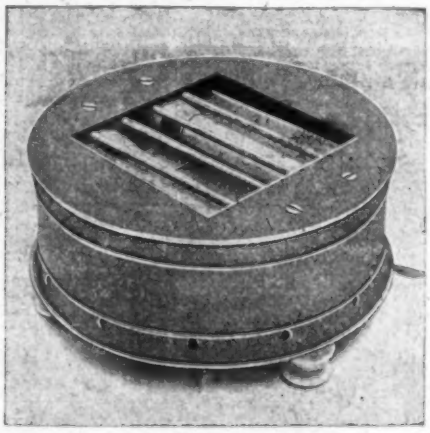

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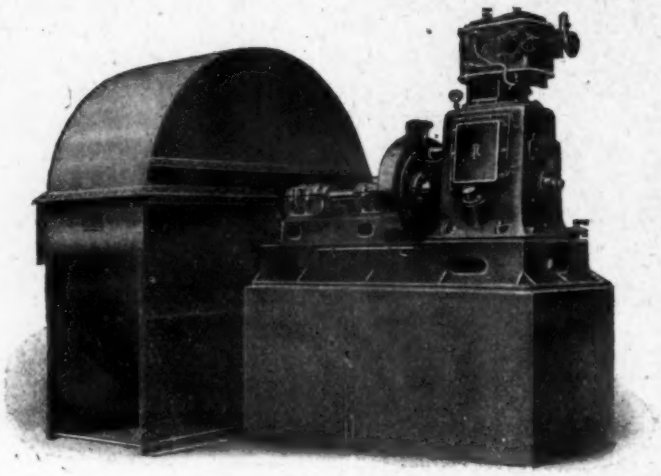

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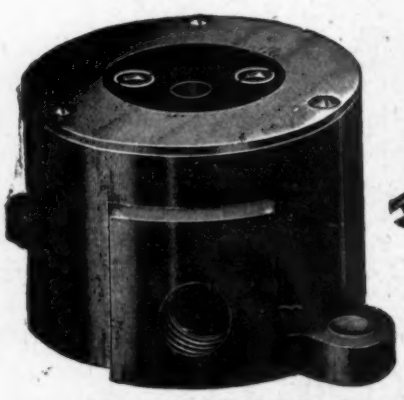

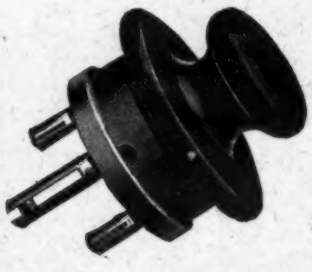

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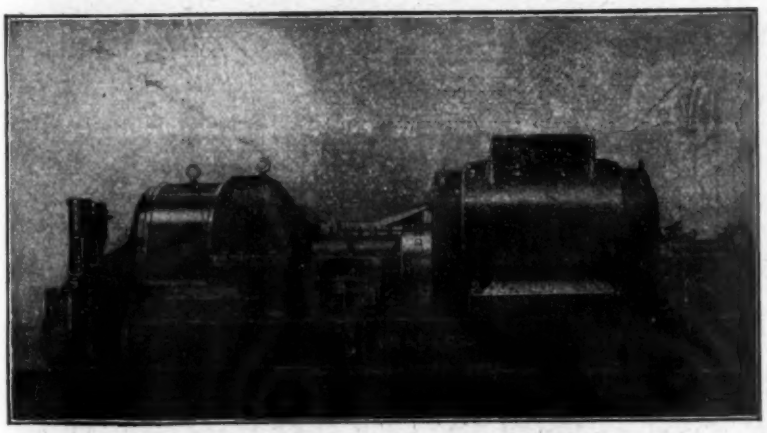

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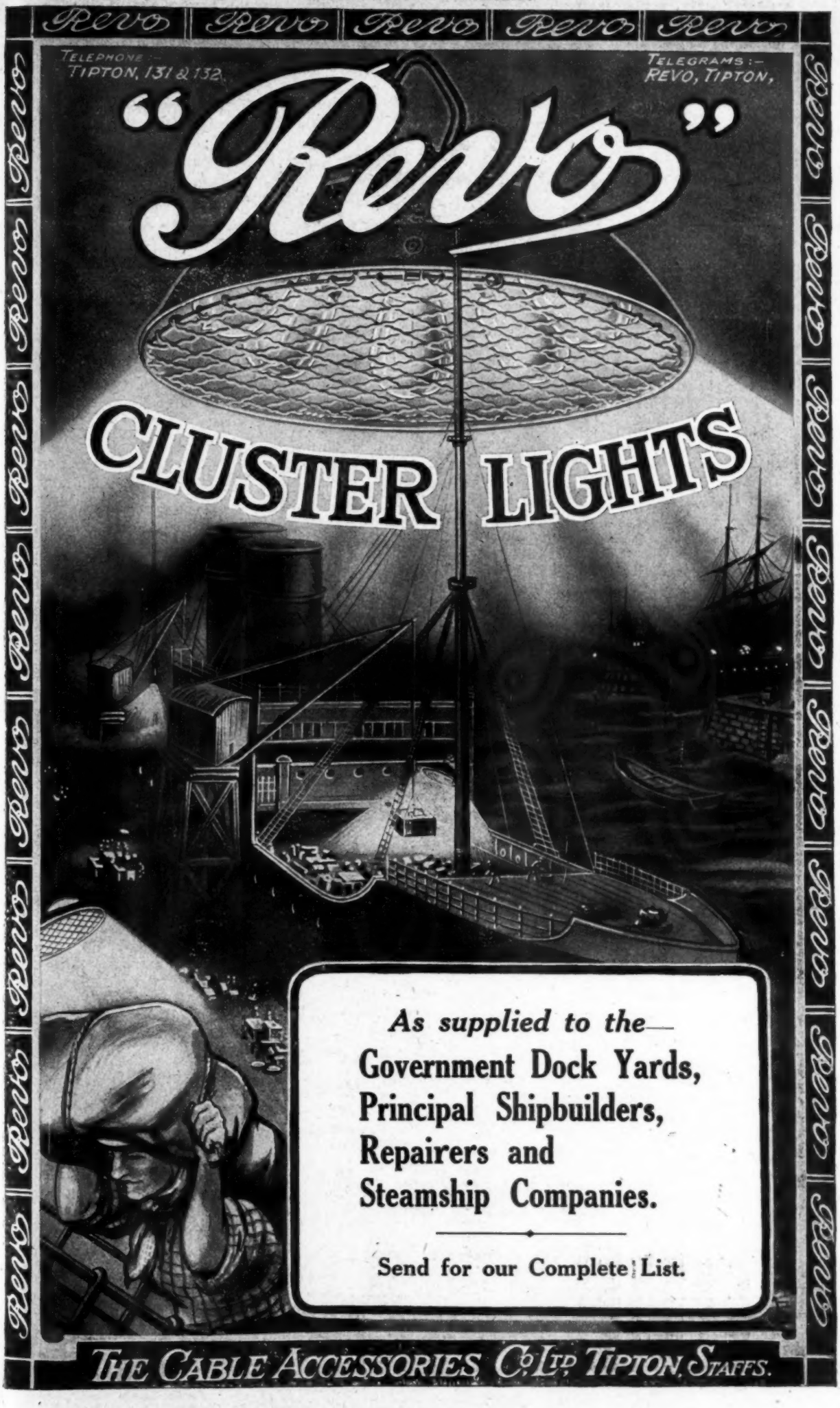
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„ 2a ...	21 × 16 ins. ...	33 × 17 ins.
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„ 2b ...	25 × 14 ins. ...	36 × 21 ins.
„ 3 ...	25 × 16 ins. ...	36 × 21 ins.
„ 3a ...	25 × 20 ins. ...	36 × 21 ins.
„ 3b ...	31 × 16 ins. ...	36 × 27 ins.
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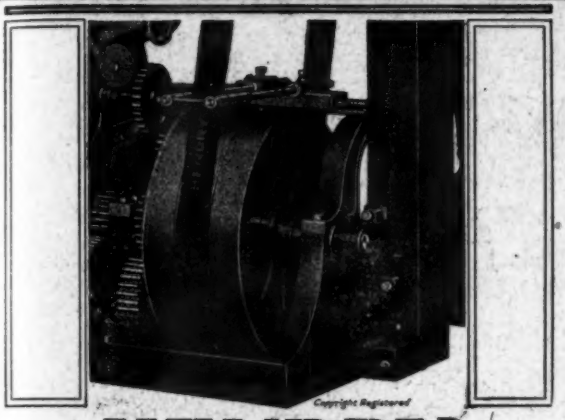

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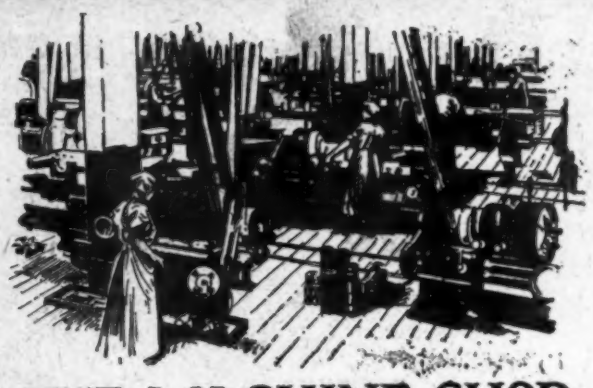

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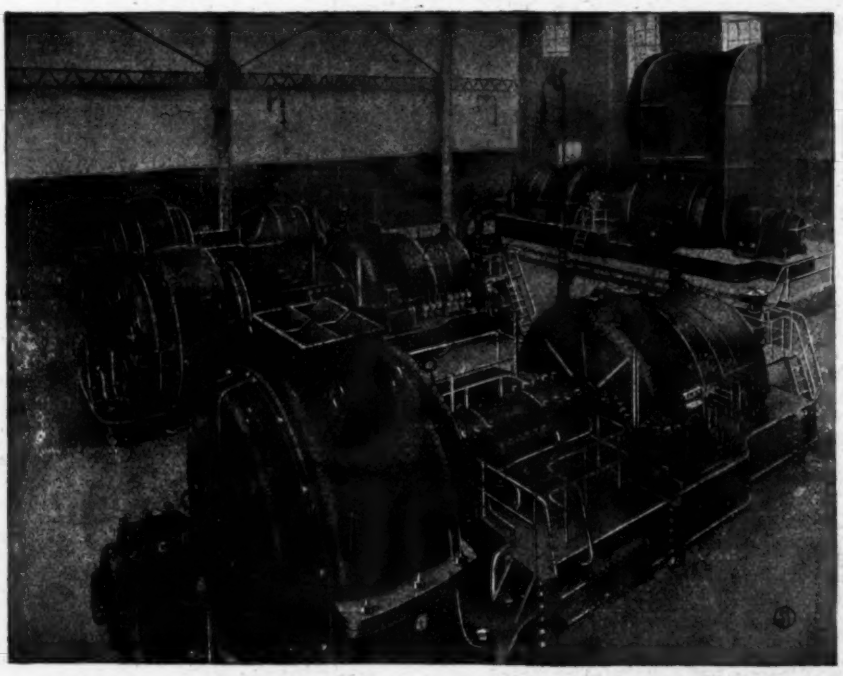

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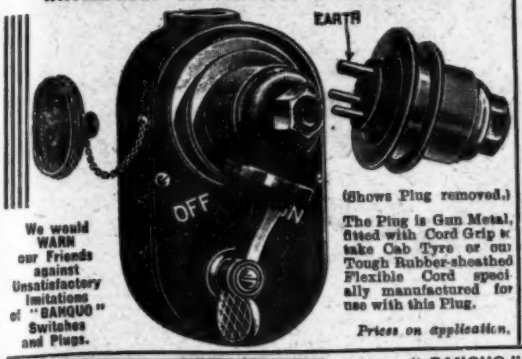

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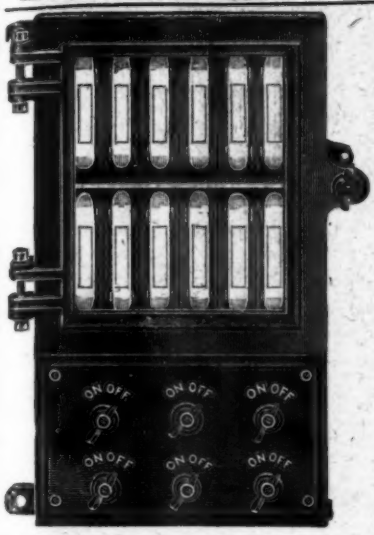

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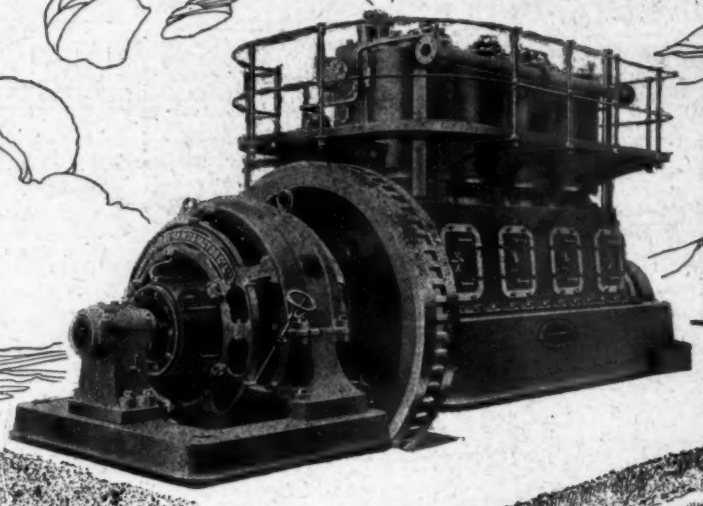

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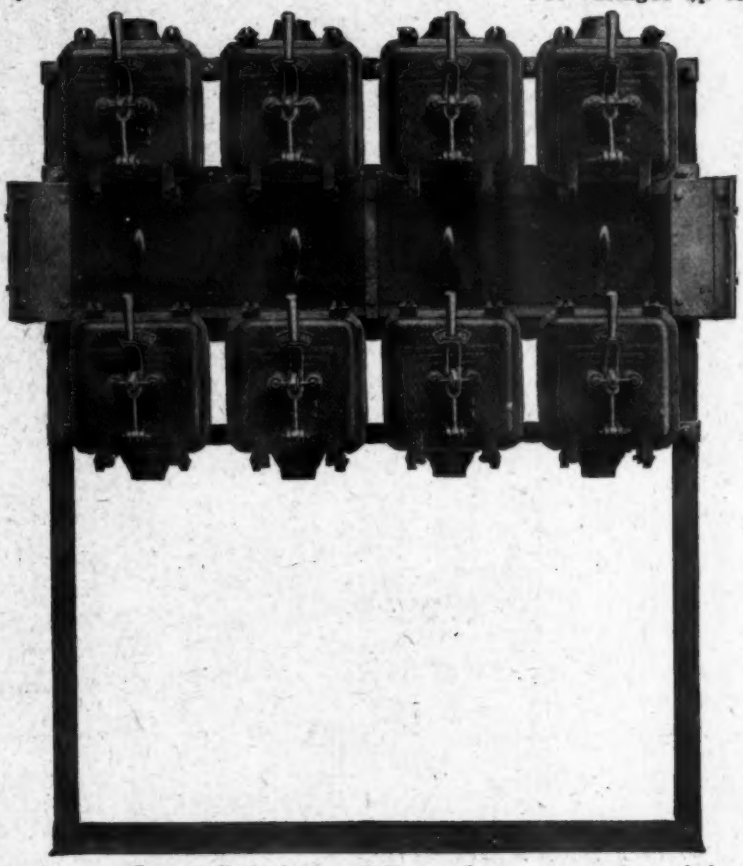

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REQUIRED, Assistant Electrical Engineer, accustomed to power station work, with an intimate knowledge of Steam Boilers, Engines, Dynamos, Accumulators, Telephones, &c. Applicants to be ineligible for military service or in a low medical category.

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SITUATIONS VACANT.—*Continued.*

GREENOCK CORPORATION.

A.C. Meter Tester and Repairer.

APPLICATIONS are invited for the position of Meter Tester and Repairer. Preference will be given to applicants having a thorough knowledge of single-phase and polyphase watt-hour meters.

Apply, stating age, military classification, experience, wages desired, &c., to CHIEF ENGINEER & MANAGER, Electricity Department, Greenock. 2989

ASSISTANT STOREKEEPER.

WANTED, Assistant Storekeeper with knowledge of Electrical Accessories, able to keep day book of receipts and issues. Wages £2 15s. per week, plus 12½ per cent.

Apply, giving reference, to ACTING CHIEF ENGINEER, St. Marylebone Borough Council Electricity Department, 19, York Place, W.1. 3006

SHIFT ENGINEER.

SHIFT ENGINEER required immediately; certified undertaking; alternating experience essential; 52 hours week; salary £172 18s., inclusive of bonuses.

Apply, with full particulars, to the BOROUGH ELECTRICAL ENGINEER, Tunbridge Wells. 3014

BOROUGH OF ST. HELENS.

APPLICATIONS are invited for the post of Chief Electrical Engineer, at a commencing salary of £650.

Applications, with full particulars as to age, qualifications, &c., to be sent to the TOWN CLERK, St. Helens, not later than FRIDAY, 8th NOVEMBER. 3008

ENGINE DRIVER.

ENGINE-DRIVER required at once; certified undertaking. Experience with high-speed engines and turbines.

Apply, with full particulars and salary required, including bonuses, to the BOROUGH ELECTRICAL ENGINEER, Tunbridge Wells. 3007

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Box Number and ELECTRICAL REVIEW address count as seven words.

AN old-established firm of Foundry and Electrical Engineers, engaged upon war work, and now carrying out own repairs, requires services of Man capable of localising and making good faults, rewinding, &c., on D.C. and A.C. motors, switchgear, &c. Man who could ultimate take charge of shop, and with general mechanical training preferred. Good prospects and permanency to suitable man. Commencing wages £5 per week. No person resident more than 10 miles away, or already on Government work, will be engaged.—"ELECTRICIAN," 10, Bush Lane, E.C. 2987

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

ARMATURE Winder. Wanted a good reliable all-round Armature Winder, with some experience of A.C. work. Permanency for good man. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply to LANG AND SQUIRE, LTD., Wales Farm Road, Acton, W. 3. 3009

ARMATURE Winders, used to repair shop, D.C. work. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply H. D. & S., 32, Newington Causeway, S.E. 1686

ASSISTANT Engineer for boiler-house supervision required at large London power station. Good mechanical training essential, with experience of boiler plant and fuel combustion. Inclusive salary £300 per annum. No person resident more than 10 miles away, or already on Government work, will be engaged.—5847, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer required for certified undertaking; must have had experience with turbo-alternators and water-tube boilers; seven shifts of eight hours per week; £4 per week, including all bonuses.—Apply, sending testimonials, to 3000, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CLERK for electrical contractor's office; one with previous experience preferred. No person resident more than 10 miles away or already engaged on Government work need apply.—Write, stating age and wages required, to 2962, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMMERCIAL Engineer wanted as Assistant to Export Manager in City office of rapidly growing firm specialising in motor car equipment and electrical machinery. Good opportunity for suitable man. No person resident more than 10 miles away, or already on Government work, will be engaged.—2949, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMPETENT Wireman required for general installation work, Certified Undertaking, permanency for suitable man.—Apply "ENGINEER," Electric Supply Co., Ltd., Northwich, Cheshire. 2992

DISTRICT Engineer required, experienced in O.H. line work, and with good knowledge of plant on consumers' premises, &c.—Apply, stating all particulars and wage required, to SCOTTISH CENTRAL ELECTRIC POWER CO., 1, Kirk Wynd, Falkirk. 2877

DRAUGHTSMAN, mechanical, wanted by railway company in London, with knowledge of electric signal interlocking preferred.—State age and experience, 2904, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN; permanent progressive position offered to capable man with knowledge of small switchgear, fuseboard and general accessory design. No one on Government work, or living over 10 miles from central London, need apply.—State age, experience and salary required, to 2902, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN wanted by Croydon firm, used to electrical mechanical work. No person resident more than 10 miles away, or already on Government work, will be engaged.—5697, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN wanted for Engineer's office in Westminster; experience in central-station piping arrangements preferred. No person resident more than 10 miles away, or already on Government work, will be engaged.—Write, stating salary and experience, and when free, A., c/o BROWN'S, 39, Tothill Street, Westminster, S.W. 5815

ELECTRICAL Engineer for Scotland, with dynamo and motor manufacturing and repairing experience, technical and practical knowledge, capable of managing men; good prospects for suitable applicant. State salary, experience and when free. No one already on Government work need apply.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning No. A6215. 5810

ELECTRICAL Fitter (permanent) required for large Works on Tyneside; standard wages paid. One with experience of H.T. switchgear and general maintenance work preferred.—Apply, giving full particulars of experience, with age, to 2939, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Jointer required; must do own plumbing. No person already employed on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, quoting Reference No. A6129. 2977

ELECTRICIAN and Mate required. Accustomed to general lighting and bell repair work. No person resident 10 or more miles away need apply.—KNIGHT, Gerrards Cross. 5798

ELECTRICIAN wanted, to look after C.A.V. lighting on fleet of motor-buses.—Apply MANAGER, Tramways Co., Oxford. 2978

ELECTRICIANS urgently required at large Shipbuilding Establishment in Birkenhead; men preferred who have had experience with ship work. No person already employed on Government work will be engaged.—Apply at your nearest EMPLOYMENT EXCHANGE, quoting Reference No. A6138. 2795

SITUATIONS VACANT.—*Continued.*

ELECTRICIANS with good experience required in several departments of large Government works in Midlands, both for A.C. and D.C. work. Shift Electrician also required, and two good men familiar with high-tension work. Vacancies also occur for Wiremen and Wiremen's Mates.—Apply at your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. 3005.

ENGINEER (Junior Assistant) wanted, with some knowledge of CO_2 Indicators and draughting. No person resident more than 10 miles away, or already on Government work, will be engaged.—State age, experience and wages required, HARRODS LTD., Engineers Dept., Brompton Road, S.W. 3015

EXPERIENCED Engineer wanted (for works about 14 miles from London), to take charge of a 200-H.P. Gas Plant and Engines. Must be ineligible for military service, and capable of undertaking electrical, printing and binding machinery repairs; good wages given to suitable man. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply, stating age, experience, &c., 5818, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIENCED Foreman or Forewoman required to take charge of flashing and mounting department, carbon filaments. No person resident more than 10 miles away, or already on Government work, will be engaged.—9728, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIMENTALIST required to take charge of small development department in an electrical switch gear works. Good theoretical knowledge necessary. No person already employed on Government work will be engaged.—Apply, giving full particulars and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6079. 2884

FIREMAN for electric power station having water-tube boilers, mechanical stokers and coal handling plant; good wages to suitable applicant.—State age, experience, wages required, and if eligible for military service, 2887. ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FITTER, Electrical; first-rate man required for maintenance work, including lifts, telephones, &c. No man need apply who is on Government work, and must reside within 10 miles of London.—Write, stating full particulars, giving experience and salary required, to TREDEGARS, LTD., Electrical Engineers and Contractors, 7, Brook Street, W. 1. 5843

FITTER wanted for generating station having high-speed reciprocating engines, turbine alternator, and shell type boilers. Salary 11d. per hour, plus 23s. 6d., plus 12½ per cent. and use of small cottage at nominal rental.—Apply, giving all particulars of experience, to RESIDENT ENGINEER, the Woking Electric Supply Co., Ltd., Board School Road, Woking. 3020

FITTER wanted for power station; Belliss engines, Babcock and Wilcox boilers. Wages 70s. week, inclusive. Permanency to suitable man.—Apply, stating experience, &c., and exemption, to MANAGER, Electricity Works, Newton Abbot, Devon. 5841

FOREMAN, electrical control gear.—Wanted by large electrical firm in Manchester district, a first-class practical man to take full charge of department on heavy control gear for steel works, &c. Only those with successful record in similar capacity need apply. No one already on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, stating age, experience in full and salary required, mentioning No. A6186. 2892

FOREMAN Electrician required for large 3-phase power distribution plant, West African gold mine.—Apply with copies of testimonials, stating age, experience and salary required, to 2985, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GOOD Electrician wanted for repair work in country; used to engines, batteries, dynamos and wiring; permanency; ineligible or over military age. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply, with copies of testimonials, to 2968, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

JUNIOR Shift Engineer required for large electric power station (certified undertaking) A.C. and D.C. Good experience and prospects. Wages £3 weekly inclusive rate.—Apply SHROPSHIRE, WORCESTERSHIRE AND STAFFORDSHIRE ELECTRIC POWER CO., Power Station, Downing Street, Smethwick. 2970

MANAGER, Winding Department.—Thoroughly trained Engineer, experienced in small and medium sizes Motors, able to work out windings (D.C. and A.C.). Applicant should detail experience, and state salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—2922, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MATHEMATICS.—Wanted, full time Instructor, one having a knowledge of electrical matters preferred, for classes of discharged sailors and soldiers.—Apply, stating age, qualification, any previous experience, accompanied by copies of two recent testimonials, to W. A. HARWOOD, Principal, Technical Institute, Gladstone Road, Wimbledon, S.W. 19. 5738

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

PATENT Agency.—Wanted, a competent man (ineligible), as Electrical-Engineer Assistant in the business of Patent Agency in a large office in London. Should possess Degree or Diploma of Technical College.—Apply, with details of training and experience, and statement of salary expected, to Box 777, Reynell's, 44, Chancery Lane, W.C. 2. 5814

REPRESENTATIVE required for North England, Scotland, and Ireland, with connections and experience. Suitable terms to good man. No person resident more than 10 miles away, or already on Government work, will be engaged.—5712, Electrical Review, 4, Ludgate Hill, London.

REQUIRED immediately, two or three experienced Electricians, used to D.C. motors and installation work, conduit wiring and telephones. No person already on Government work can be engaged. —Apply your nearest Employment Exchange, giving age and references, quoting No. A6185. 2893

ROLLING Stock Superintendent wanted. Previous experience in upkeep and repair of electric cars essential, and preferably with generating station experience. Commencing salary £2 15s., plus war bonus 25s., per week.—The Chatham and District Light Railways Co., Luton Road, Chatham. 2834

SHIFT Engineer required for certified undertaking engaged on munitions work. Experience on Babcock & Wilcox boilers, turbo-generators and E.H.T. 3-phase supply essential. Salary 65s. (including war bonus) plus 12½ per cent.—Apply, with full particulars of experience, age, &c., to Kent Electric Power Co., Railway Street, Chatham. 2925

SHIFT Engineer required power station in West of England, E.H.T., 3-phase turbos and mechanically fired. Boiler experience necessary.—Apply immediately, stating age and salary required (permanent appointment), 5776, Electrical Review, 4, Ludgate Hill, London.

SIX Men required, used to good class switch work; also six Armature Winders. No person resident more than 10 miles away, or already on Government work, will be engaged.—J. Stone and Co., Ltd., Deptford, London, S.E. 2944

STOREKEEPER required who has had good experience in a modern stores dealing with all kinds of electrical apparatus. No person already engaged on Government work, or residing more than 10 miles away, need apply.—Apply, stating age, full particulars of experience, with dates and salary expected, to J. Stone & Co., Ltd., Works Dept., Deptford, S.E. 14. 2966

SUB-STATION Attendant required, London district; experience with rotary converters and E.H.T. switchgear necessary.—Apply, stating age, details of experience and wages required, to 3019, Electrical Review, 4, Ludgate Hill, London.

SWITCHBOARD Attendant wanted for certified undertaking; must have had experience in alternating generating station; seven shifts per week of eight hours; wages £2 16s. inclusive.—Apply, with particulars and testimonials, to 3001, Electrical Review, 4, Ludgate Hill, London.

SWITCHBOARD Attendant wanted, Lighting and Tramway Station. Possible advancement to shift engineer when proficient. Wages £3 7s. 6d. weekly.—Apply Weston-super-Mare and District Electric Supply Co., Ltd., Locking Road, Weston-super-Mare. 2917

TECHNICAL Assistant wanted by motor control gear manufacturers in London district. Must be conversant with the details of design and manufacture of all classes of motor control gear. No person on Government work, or living more than 10 miles away, engaged.—Apply, stating age, experience and wages required, to 5772, Electrical Review, 4, Ludgate Hill, London.

TESTER required for switchgear works. The work includes the calibration of circuit-breakers and the testing of starters and controllers. No person already employed on Government work will be engaged.—Apply, giving full particulars and salary required, to your nearest Employment Exchange, mentioning No. A6080. 2885

THREE good Armature Winders and one Fitter, required, good positions for right men. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply E. M. C., 18, Gun Street, E. 1. 5829

VACANCY occurs for a competent Electrician to take charge of private electrical plant on estate situated upon South Coast; cottage provided.—Applications in first instance to Engineer, Electricity Works, Staines. 2973

WANTED, a Cost Clerk, preferably with experience in cable and electrical manufactures. Must be capable of instituting and organising detailed costing department. Applications must contain full particulars of experience and salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—2995, Electrical Review, 4, Ludgate Hill, London.

WANTED, a first-class Electrical Fitter (lighting, bells, &c.), for a really reliable man with good record. There is a permanency waiting at 1s. 6½d. per hour. No person resident more than 10 miles away, or already on Government work, will be engaged.—Electric Light Insurance & Maintenance Co., 1/2, Rupert Court, Piccadilly, W. 1. 3012

SITUATIONS VACANT.—*Continued.*

WANTED, Assistant for Apparatus Department of Electrical Engineering Firm in the Midlands. Applicants should have good technical training. Nobody employed on Government work will be engaged. State age, experience and salary required. —Apply to your nearest Employment Exchange, mentioning this paper and No. A 6199. 2916

WANTED, Assistant to manager of factory on electrical instrument work, chiefly W.T. Must be good at costing and office routine. State experience and salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—5859, Electrical Review, 4, Ludgate Hill, London.

WANTED, by a firm in the S.E. district engaged on munition work, first-class Telegraph Mechanics. No person resident more than 10 miles away, or already employed on Government work, will be engaged.—State age and experience to 6125, Electrical Review, 4, Ludgate Hill, London.

WANTED, by leading engineering insurance company, Electrical Surveyors, having good knowledge of the theory and practice of alternating and direct current plant. Applicants must be ineligible for the Army or Navy.—2581, Electrical Review, 4, Ludgate Hill, London.

WANTED by Power Supply Company in London, a Junior Assistant. Must have technical training. Good opportunity to gain up-to-date experience in all branches. Previous experience not essential.—5683, Electrical Review, 4, Ludgate Hill, London.

WANTED, Draughtsman for Switchgear Department of Electrical Engineering Works in Midlands. Nobody employed on Government work will be engaged. State experience, age, and salary required.—Apply to your nearest Employment Exchange, mentioning this paper and No. A 6200. 2915

WANTED Electrician for small three-phase plant, South Coast. No person at present engaged on Government work need apply.—Apply, with full particulars, to your nearest Employment Exchange, quoting No. 5833.

WANTED first-class Winder, capable of winding A.C. and D.C. Motors. State experience, age and wages required.—Apply Powell Duffryn Co., Bargoed. 2830

WANTED, for India, central station, Engineer with full mechanical knowledge. Ineligible for military service. Commencing £400 per annum.—State experience, Z Y 768, care Deacons, Leadenhall Street, E.C. 3. 5706

WANTED, for the Midlands, Electrical Instrument Maker for repair work; good wages paid to suitable applicant. Nobody employed on Government work will be engaged.—Apply to your nearest Employment Exchange, mentioning this paper and No. A6248. 3017

WANTED, General Assistant to Works Manager in an old-established electric lamp factory. Good opening and progressive salary. No person already on Government work will be engaged.—Apply your nearest Employment Exchange, mentioning No. A5667. 2037

WANTED immediately, by a London electric supply authority, Assistant in test room, used to the repair and calibration of A.C. and D.C. meters. Theoretical training essential. Salary £3 a week, including all bonuses up to date.—2967, Electrical Review, 4, Ludgate Hill, London.

WANTED, Purchasing Agent; should have experience in purchasing electrical stores and fittings, works stores, &c. Applications must contain full particulars of experience and salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—2994, Electrical Review, 4, Ludgate Hill, London.

WANTED, Qualified Electrical Engineer with good mechanical knowledge for consulting engineer's office, chiefly dealing with iron, steel and mining work. State age, experience and salary.—2976, Electrical Review, 4, Ludgate Hill, London.

WANTED, two first-class Electricians for South Wales, accustomed to the maintenance of power and light in steel works; good wages per week of 53 hours, usual rates of overtime for trade. No person already employed on Government work will be engaged.—Apply your nearest Employment Exchange, mentioning No. A6213. 2979

WANTED two thoroughly capable Electrical Draughtsmen, accustomed to A.C. and D.C. dynamo and motor details. No person already employed on Government work will be engaged. —Apply, stating age, experience and salary required, to your nearest Employment Exchange, mentioning No. A6211. 2971

WANTED, Works Clerk for factory on W.T. and similar electrical work in N.W. district. State experience and salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—5858, Electrical Review, 4, Ludgate Hill, London.

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

WANTED, Works Manager, with special knowledge of Accumulator manufacture, preferably with experience of traction batteries. Must be practical, energetic and good organiser. Applications must contain full particulars of experience and salary required. Only first-class men need apply. No person resident more than 10 miles away, or already on Government work, will be engaged.—2996, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WIREMAN for house wiring and general repairs.—Apply, stating wages, experience and references, to SUFFOLK ELECTRICITY SUPPLY CO., Felixstowe. 5775

WIREMAN-Improver (smart), lighting, power. No person resident more than 10 miles away, or already on Government work, will be engaged.—LINDOW, 87, Parkhurst Road, Holloway. 5783

WIREMEN wanted; also good Telephone Repair Hand. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply F. G. EDEY & CO., LTD., 25, Warwick Lane, Newgate Street, E.C. 5726

WIREMEN Wanted; permanency. Electricity Undertaking in the Midlands. Rate 1s. 3d. per hour, including all bonuses.—Reply, stating age and experience, to 2870, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKING Engineer required, to take charge of a shift in a small electric station near London. Experience in similar capacity preferable.—Write, stating age, form of exemption, and wages required, to 2865, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKING Foreman for electrical accessories manufacture, North London; small switches, &c. Good organiser and disciplinarian essential. Permanency for good man. No person resident more than 10 miles away, or already on Government work, will be engaged.—State age, qualifications and wages required, 5743, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

YOUTHS, 16½-17½ years of age, may receive full-day tuition and practice in Wireless Telegraphy; £3 10s. per term of 13 weeks.—Splendid chance of promotion for bright lads.—Apply W. A. HARWOOD, Principal, Technical Institute, Gladstone Road, Wimbledon, S.W. 19. 5739

SITUATIONS WANTED.

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ADVERTISER, A.M.I.E.E., with over 18 years' exceptional experience and technical training as cable engineer, desires re-engagement. — 5817, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER as Foreman, full control factory or large contracts, power and lighting, 26 years' experience; permanency required; shortly disengaged.—5821, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER desires change to London district, as Shift Engineer, experience with three-wire systems and Diesel engines. State wage offered.—5702, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, young man recently discharged, with exceptional experience wholesale electrical supplies trade, seeks responsible position with firm of repute. Prior to joining H.M. Forces, secretary to well-known London wholesale house. Similar position preferred, or would open wholesale department for progressive concern, or act as sales manager, buyer, &c. Capable organiser and thoroughly experienced control of staff. — 5842, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (18), ineligible, requires situation as improver in electric works; two years' electrical and mechanical experience; state wages.—DERMODY, 149, Amesbury Avenue, S.W. 2. 5820

AN Engineer, at present employed on the commercial side of an electrical undertaking, desires position as Representative or Agent.—5804, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Engineer, electrical and mechanical, accustomed to carrying out large contracts. Good organiser, and thoroughly experienced in the management of large numbers of men.—5831, ELECTRICAL REVIEW, 4, Ludgate Hill, London

CAR Painter seeks permanency on Tramways. Good all-round man; 20 years' experience on car work. Highest testimonials. —5757, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer, desires permanent post. 16 years' sound experience A.C. and D.C., &c.; free November 8th.—Mr. B., c/o Baldwin, 47, Cliffe Street, Keighley, Yorkshire. 5716

CHIEF Clerk (30), municipal electricity works, desires change to any progressive position. Good organiser. First-class knowledge of mathematics, French, and of the generation and distribution of electricity.—5849, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

DISCHARGED Army Officer (26), single, requires responsible post with manufacturing electrical engineering firm or other of high repute. Fully conversant with electrical matter, including Government contracts, having secured highest and varied experience with large engineers in London. Prepared to act as assistant to secretary, or would consider responsible position where electrical commercial experience can be utilised to the best advantage. Highly ambitious and truly energetic.—5760, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Cable Works Manager and Engineer, 16 years' experience in the manufacture of all classes and grades of cable, desires similar position with reliable firm desirous of getting maximum output at lowest cost. — 5774, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, qualified, requires post in Australia or Colonies. Complete equipment and installation of works or factory plant, maintenance and management; A.C. and D.C. machinery.—5765, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, with 14 years' first-class theoretical and practical experience of large plants, E.H.T., single, polyphase and D.C., seeks responsible position: specifications, drawings, erection and complete maintenance.—5827, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and mechanical Engineer (25), with good theoretical and practical training and good knowledge of power station works, seeks responsible post.—5782, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer (36), with first-class theoretical and practical experience in the erection, running and management of large electrical plants, desires change. Capable organiser and experienced in management of staff.—5848, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, with technical, practical and commercial training, requires situation as contractor, manager, or similar appointment; 18 years' experience in estimating, control of men, interviewing, &c.—5803, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer (33), A.M.I.C.E., A.M.I.E.E., with college training and experience in instrument and research work, desires permanent responsible post. — 5808, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN, D.C. experience, seeks engagement West of England. Ineligible.—R. ROBERT, 39, Kensington Road, Weston-super-Mare. 5701

ELECTRICIAN (Foreman), disengaged shortly, desires situation in shipyard or otherwise. Experienced shipyards (full charge), steel works, Admiralty work, electric welding, &c.; some commercial and drawing office experience. — 5758, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINE Fitter, seeks berth as foreman or charge hand of shop. All-round man.—5828, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, A.M.I.E.E. (discharged), desires permanent responsible position in London; 21 years' first-class experience. Accustomed to management of men, supervision of erection and running plant, installations, office routine and estimating.—5786, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER-Electrician (47) seeks responsible post. Experienced erecting and maintenance of all classes of plant. Good mechanic. References.—A. GOING, 49, Rosedale Road, Forest Gate, E. 7. 5732

FIRST-Class Winder, alternating and direct-current; 8 years' experience in manufacture and repairs, all types; good all-round mechanic; young and energetic; seeks charge or other responsible position.—"ENGINEER," 27, Chetwode Road, Balham S.W. 17. 5844

FITTER'S Assistant. Man seeks opening as Fitter's Helper.—44, Kensington Road, Reading. 5836

MANAGER or Foreman. Thorough experience in all branches, power, house and factory wiring, general estimating, &c.—5756, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MECHANICAL and Electrical Engineer, A.M.I.E.E., desires change. Grade 3. Age 40 years. 22 years' experience, manufacture, design, and administration. Specialising in telephones, telegraphs, cables, aeroplanes, and aeroplane engines. Excellent references.—5854, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

METER Inspector (29), ineligible, seven years' Wolverhampton Corporation, desires change. Experience, installations, inspection of apparatus, consumers' queries, central station, A.C. and D.C., switchboard.—5717, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

SITUATIONS WANTED.—*Continued.*

TRACTION Engineer, just discharged through wounds, requires responsible position in London or suburbs; 15 years' experience in erection and maintenance of electrical car equipment. Good experience in organising and controlling large staff.—5784, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKS Foreman or Manager seeks situation. Ten years' practical experience; nine years supervisor electrical measuring, telegraph and wireless instrument making. Well up in progressive methods of machine and fittings shop. — 5785, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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DIRECTORSHIPS AND PARTNERSHIPS required, London and Provinces, for purchasers and investors with £1,000 to £10,000 available.

ARNOLD & CO. (LONDON), LTD., 143, Cannon Street, E.C.

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PARTNERSHIP (active) required after the war by an experienced Electrical and Mechanical Engineer, University graduate, A.M.I.Mech.E., A.M.I.E.E., in an electrical and mechanical consulting firm, or would consider an opening in an established manufacturing firm. Capital available. Not farther North than Manchester. Principals only; no agents.—Reply in confidence to 5639, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AGENCIES.

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A WELL-KNOWN firm of Motor Control Gear Manufacturers wish to appoint as Sole Agents for Ireland, an energetic firm established in that country.—5819, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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1000-KW. Turbo-Generator, E.A.G., 500 volts, 50-period, 3-phase, complete with two switch panels, surface condenser, with electrically-driven air and circulating pumps, together with piping and a quantity of new spare parts. The whole practically new and ready for despatch at Liverpool.

500-KW. Parsons Steam Turbo, 460/500 volts, D.C., in perfect condition, and complete with condensing plant.

300, 256, 200, 185 and 160-KW. Belliss Generating Sets, 460/500 volts and 220-volt D.C.

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"Victor" Full Automatic Capstan Lathe, with 2¾" hollow spindle.
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Portable Electric Radial Arm Drilling Machine, by Kendal & Gent, 6' arm, 2½" spindle.
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ONE 500-KW. triple-expansion Set, engine by Browett and Lindley, H.P. cyl. 17½", I.P. 25", L.P. 35" × 14" stroke. Single-phase Alternator, by British Westinghouse Co., 2100 volts, complete with exciter, &c.

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Two ditto, 130-KW., first-class condition. Can be seen as at work. Immediate delivery can be given.

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(*Continued on next page.*)

FOR SALE.—*Continued.*

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110 VOLTS.

One 10-H.P. Shunt Dynamo, 1050 R.P.M.
One 40½-H.P. Comp. „ 850 R.P.M.

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Three 1/17-H.P. Series Motors.

One	1/7-H.P. Shunt	1900	R.P.M.
One	1/6-H.P.	1725	„
Four	¼-H.P.	1600	„
Two	½-H.P.	1600	„
Three	1-H.P.	1400/1600	„
Nine	2-H.P.	1300	„
Five	3-H.P.	1200	„
Three	12½-H.P.	1225	„
Two	20-H.P.	700	„
One	29-H.P.	940	„
One	30-H.P.	1120	„
Two	35-H.P.	870	„
Two	37-H.P.	580	„
One	41-H.P.	1050	„
One	45-H.P.	720	„

All new machines.

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One ¾-H.P. Slip Ring, 700 R.P.M.
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One	1½-H.P.	1420	„
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Seven	2-H.P.	1400/1440	„
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One	3-H.P.	940	„
One	4-H.P.	1440	„
One	5-H.P.	1430	„
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One	1-H.P. Shunt Motor,	1750	R.P.M.	
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One	2-H.P.	1185	„	
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One	5-H.P.	1275	„	
Two	5-H.P.	1000	„	
One	5-H.P.	1430	„	
One	5-H.P.	1370	„	
Three	7½-H.P.	750/1350	„	
Two	8-H.P.	1030	„	
One	10-H.P.	320/960	„	variable speed.
Two	10-H.P.	1050	„	
One	12-H.P. Series	1000	„	
Six	12-H.P. Shunt	820/830	„	
Two	12½-H.P.	1270	„	
Nine	14-H.P.	820/980	„	
One	15-H.P.	1100	„	
One	25-H.P.	1175	„	
Two	25-H.P.	880/1000	„	
Two	26-H.P.	750	„	
One	30-H.P.	500/1000	„	variable speed.
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One	38½-H.P.	725	„	
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	H.P.	Volts.	R.P.M.	Winding.	Makers.	Type.
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„	20	460/550	800	Shunt	B.T.H.	„
„	15	440	800	„	Royce, Ltd.	„
„	15	230	840	„	„	„
„	8	230	480	Com.	„	„
„	12	200/220	950	Shunt	Lancs. Dynamo	„
„	10	460	900	„	Keighley Elec. Co.	„
Two	13	420	1000	„	Mather & Platt	Toty. enc.
One	10	420/440	1000	„	Electromotors	Enc. vent.
„	5	440	1250	„	„	„
„	5	220	1375	„	General Elec. Co.	„
Two	4	400	1150/1835	Inter.	„ „	„
One	3	200	1275	Shunt	Deihl Elec. Co.	„

A.C. MOTORS.

	H.P.	Volts.	R.P.M.	Phase.	Periods.	Makers.	Type.
One	27/30	350/400	720	3	50	Clayton Motors	Slip ring.
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Three	3	420	1450	3	50	Wright & Wood	In. motor
One	5	100	1000	Single	50	„ „	„

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COMPRISING

BROWETT, LINDLEY Totally Enclosed Vertical Engine; 19-in. and 36-in. cylinders, by 18-in. stroke. Metallic packings, piston valves, drum governors, fly-wheel and barring gear.

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Carriage forward. Packing credited on return.

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About 2,000 yds. of No. 5 bare overhead copper wire.

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(Continued on next page.)

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

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All 230 volts, direct-current, complete with suitable control gear.

Quantity.	H.P.	Speed.
1	50	400
1	40	450/500
3	25	400
6	15	400
1	16	490
1	15	750
1	5	750
2	5	670
1	5	1000
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(Continued on next page.)

FOR SALE.—*Continued.*

FOR Sale, seven 20-H.P., 500-volt B.T.H. Tramway Motors, with or without controllers.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 2934

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6-H.P., 460-volt Crane or Hoist Motor, totally enclosed with B.T.H. controller and circuit-breaker; as new.—DRUMMOND AND Co., Middlesbrough. 5695

FOR SALE.—*Continued.*

6-INCH Gwynne Centrifugal Pump, direct coupled to 17-H.P., 460-volt, shunt, Westinghouse Motor, with control panel, only used short while, condition perfect.—DRUMMOND & Co., Middlesbrough. 5690

6½-H.P. Crompton Electric Motor, No. 17187, volts 480, pulley, starter and rails, £50.—FRED AFFLECK, Princes Street, Swindon, Wilts. 5865

12½-H.P. Westinghouse Motor, 220 volts D.C., series wound, 760 R.P.M.—WESTERN ENGINEERING COMPANY, Swansea. 2942

12½-KW. Steam-driven Bellias-Westinghouse, 120-volt, D.C. Lighting Set. Immediate delivery; in new condition.—WESTERN ENGINEERING COMPANY, Swansea. 2940

14-B.H.P., Totally-enclosed, Compound-wound Mather & Platt Motor, 230 volts, D.C., 500 R.P.M., with or without magnetic brake of the "post" type. Reversing controller and resistances.—WESTERN ENGINEERING COMPANY, Swansea. 2941

15-B.H.P. Blackstone semi-Diesel crude oil engine, in splendid condition.—PARKINGTON, Newcastle Emlyn. 2901

15-H.P., 460-volt, series wound, protected Motor, by Westinghouse; speed 600. Condition as new.—DRUMMOND & Co., Middlesbrough. 5692

22-KW., 110-volt, 200-amp., multipolar Zone Generator, with pulley and slide rails; just stopped working.—DRUMMOND AND Co., Middlesbrough. 5693

44-KW., 110-volt D.C. Generator, compound wound, three-bearing type, with rope pulley and slide rails; speed 600.—DRUMMOND & Co., Middlesbrough. 5691

150-KW., D.C. Generator, multipolar type, 500 volts, with rope pulley; splendid condition.—HARRY H. GARDAM AND Co., LTD., Staines. 2952

190-H.P., six-pole D.C. Motor, by Ernest Scott & Mountain, 500 volts, arranged for rope drive.—HARRY H. GARDAM AND Co., Ltd., Staines. 2827

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One Korting type Ejector Condenser, for 7" exhaust pipe.
All the above may be new or second-hand, must be in good condition.
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A.C. and D.C. Motors (second-hand), any type, any condition, wanted for prompt cash.—A. LEAROYD & SON, Bridge Works, Heatherley Street, Clapton, N.E. 5391

(*Continued on next page.*)

ARTICLES WANTED.—*Continued.*

ALEAROYD & SON, Bridge Works, Clapton, N.E.—Telephone Dalston, 2278; Telegrams: Frangible, Lowclap, London—buys for prompt cash every description of second-hand Generating Sets, Accumulators, Motors, Transformers, old Arc Lamps, Meters, Cable, Scrap Metals, Metallic Drosses, &c., &c. Enquiries solicited. Established over 50 years. 5392

AMMETER, 0—150. Voltmeter, 0—500. 100-amp. D.P. Lever Switch and Porcelain Handgrip Fuses. 100-amp. Double-Throw Lever Switch. Also 20 yds. No. 1 bare Copper Wire, wanted at once.—STEWART, Electric Station, Coalisland, Co. Tyrone. 5023

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ELECTRIC Loco. Jib Crane, to lift 10 or 15 tons to radius of about 16 feet; motor suitable for 110 volts D.C.—Full particulars and price, with illustrations if possible, to be sent to 2988, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, direct-coupled Set, about 50/75 KW., 220 or 440 volts, D.C., preferably the latter. Full details and price must accompany offer.—2828, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, Generator, 35 to 40 KW., 200 volts, shunt or compound two or three bearings, good running condition only.—EAST ANGLIAN ENGINEERING CO., LTD., "Bull" Motor Works, Stowmarket. 5826

WANTED, Motor-Generator: Motor 100 volts, single-phase, 50 periods; Generator, 20 to 30 volts, 50 periods.—5856, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Motor-Generator: Motor 100, 200 or 530 volts, D.C.; Generator, 20 to 30 volts, 50 amperes.—5855, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, vertical high-speed Gas Engine, direct coupled to about 10-KW. D.C. Dynamo, 220/230 volts.—State make, maker's No. and full details, to ELECTRICAL ENGINEER, Aldershot Gas, Water & District Lighting Co., Electricity Works, North Camp, Farnborough, Hants. 2972

WANTED, 1-KW. compound Dynamo, 65 volts, moderate speed; one 250-watt compound Dynamo, voltage immaterial; one 8-volt, 10-amp., compound Dynamo; one 220-volt, ½-H.P. Motor; one 220-volt, ½-H.P. Motor.—5824, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARTICLES WANTED.—*Continued.*

WANTED, 2-way 5-amp. Switches; bronzed finish preferred. Also Conduit Tubing and 600-megohm Cable.—105, Loyd Road, Northampton. 5771

WANTED, 20-H.P., 440-volt, D.C. Motor.—MARTINS, 320, Witton Road, Birmingham. 5851

WANTED, 35/40 H.P. D.C. Motor, shunt wound; speed about 700 R.P.M.; suitable for 460 volts. State price and maker.—2878, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, 48" Port Hole Fan, complete with 220-volt, D.C. Motor; also 10-H.P., 220-volt, D.C. Motor, and 5-H.P., 200-volt, 50-cycle, two-phase Motor.—Particulars and price to GREEN AND SMITH, 32, Great George Street, Leeds. 5860

WANTED, 70/100-volt, 20-ampere (about), Shunt-wound Dynamo.—105, Loyd Road, Northampton. 5830

WANTED, 250/300-K.V.A. Alternator, 200 volts, 3-phase, 50 periods, about 330 revs.—5746, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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Secretary.

York, 21*st October*, 1918. 2975

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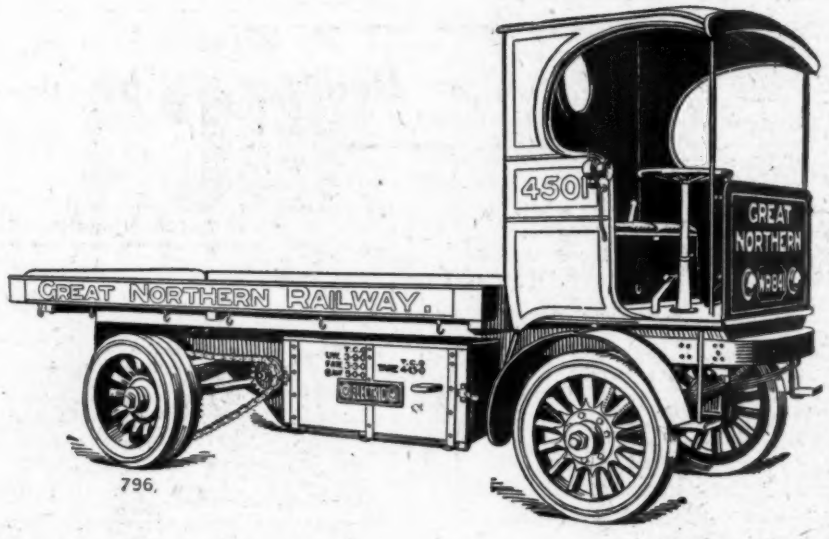

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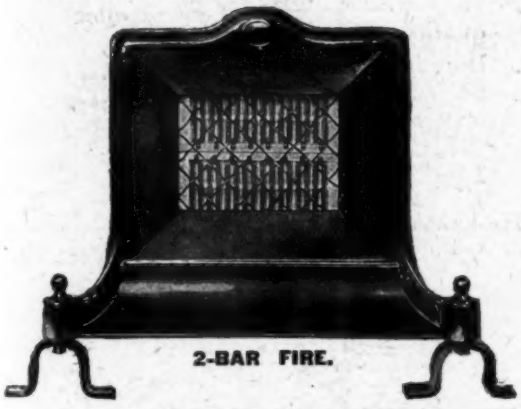

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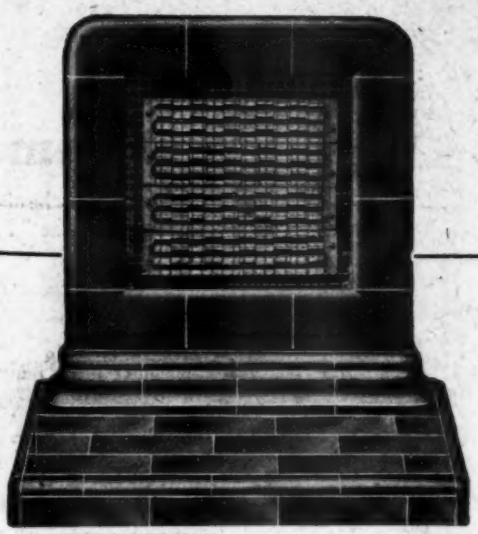

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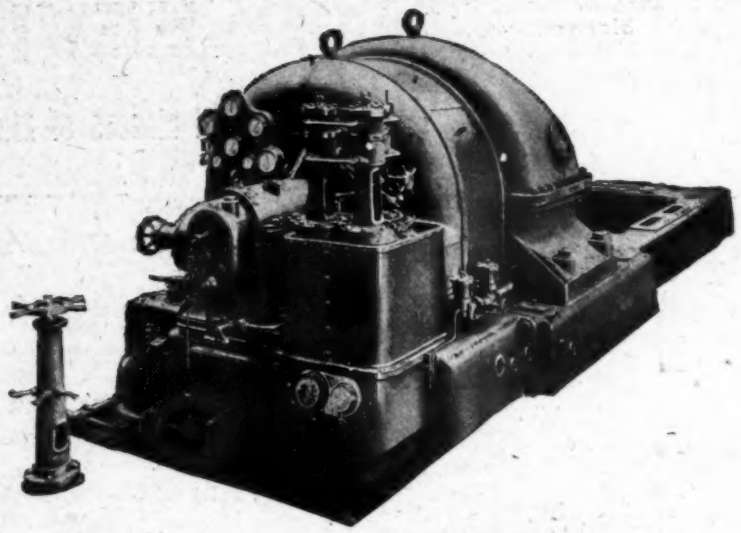

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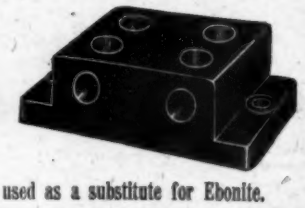

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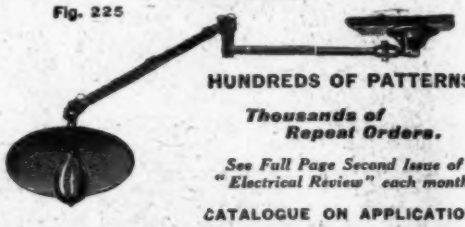

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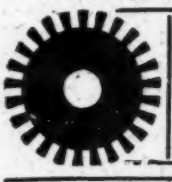

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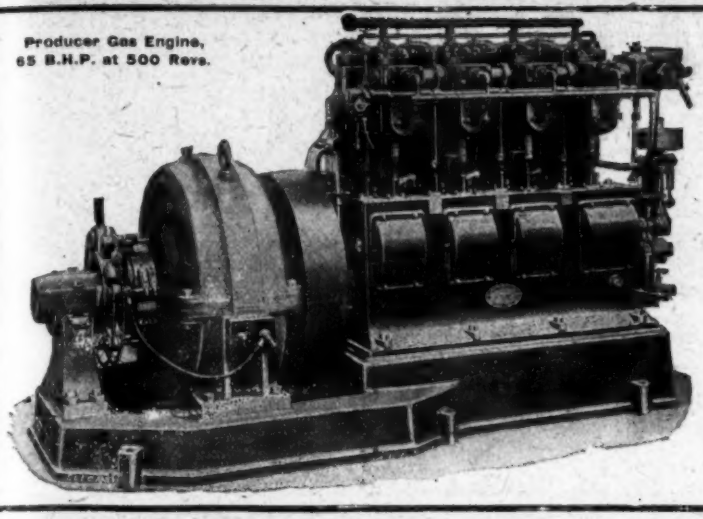

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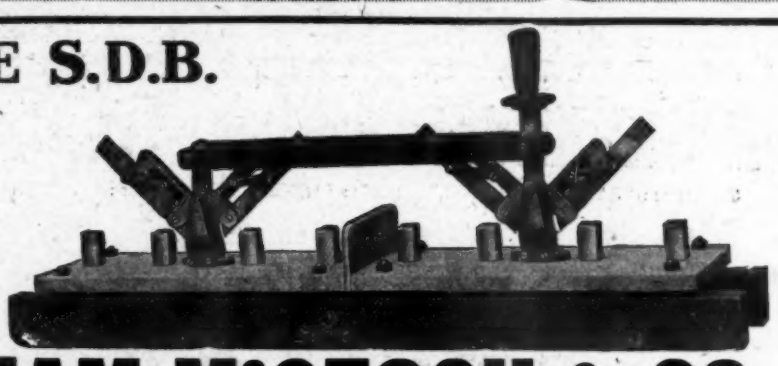

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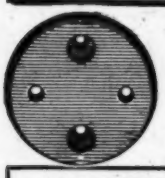

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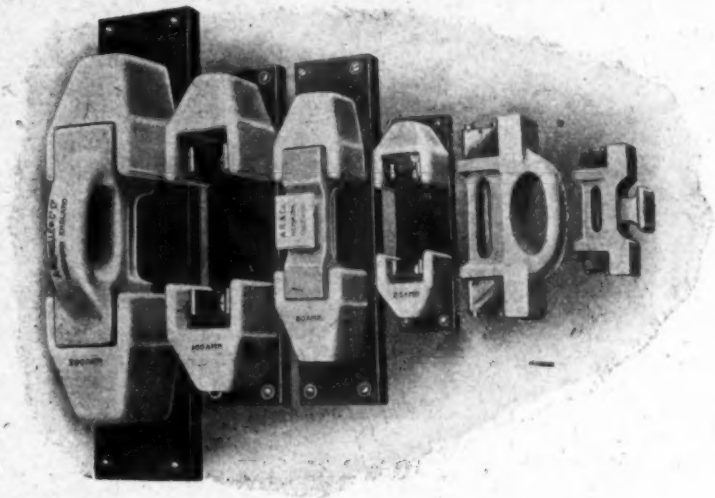

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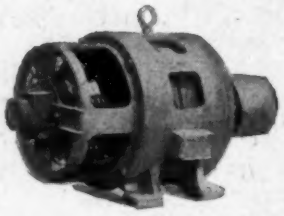

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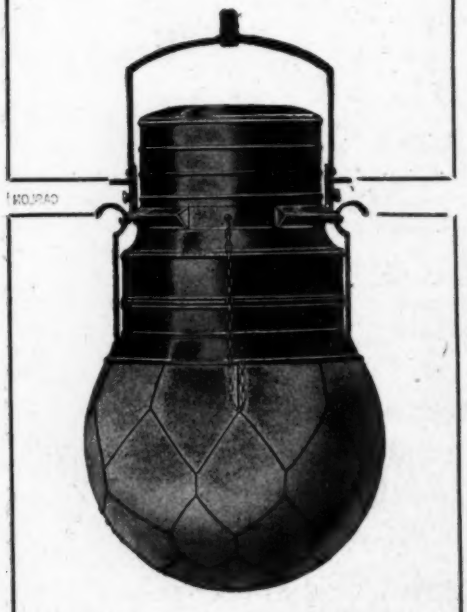

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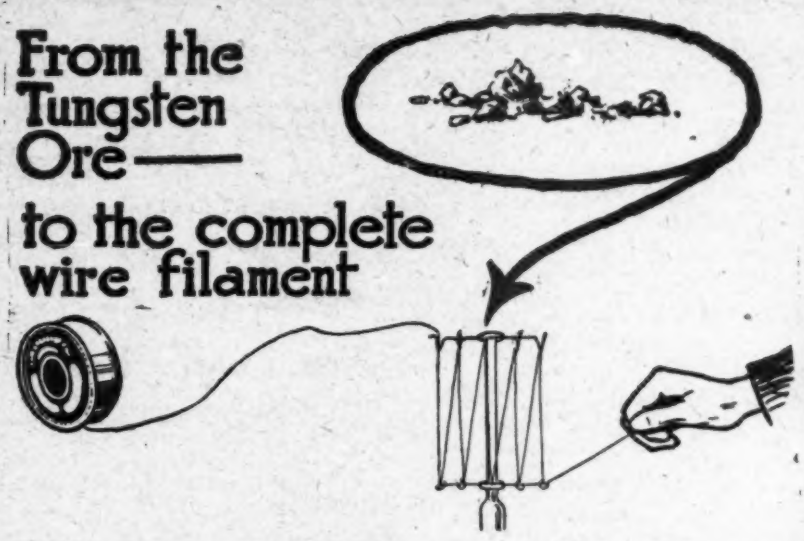

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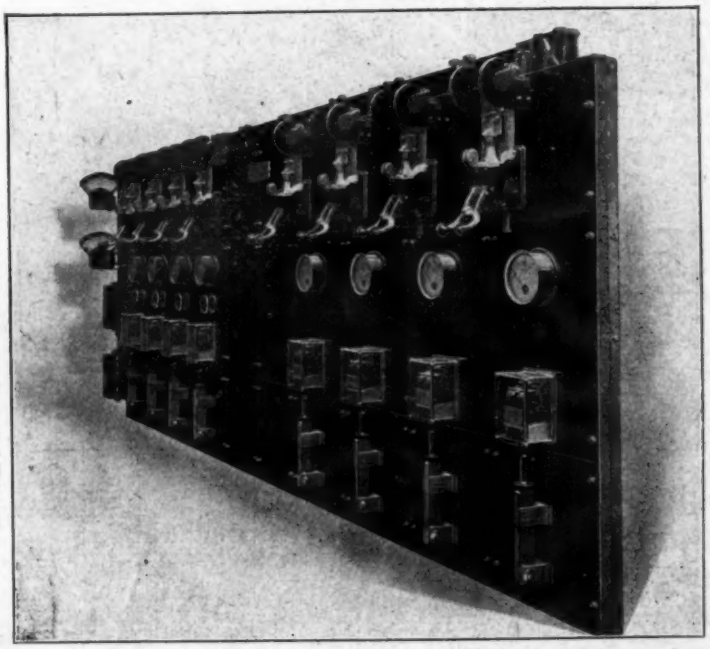

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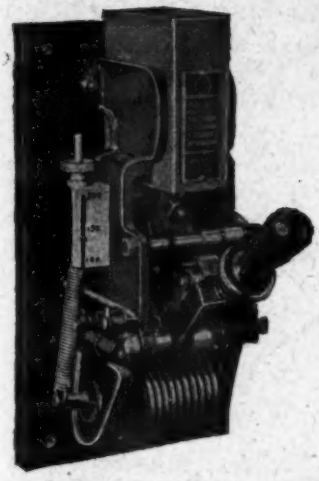

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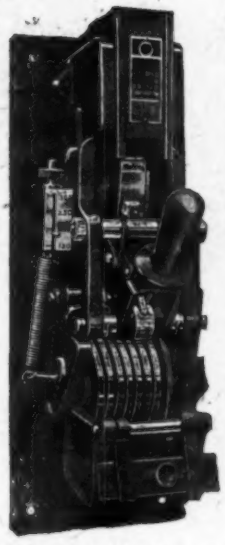

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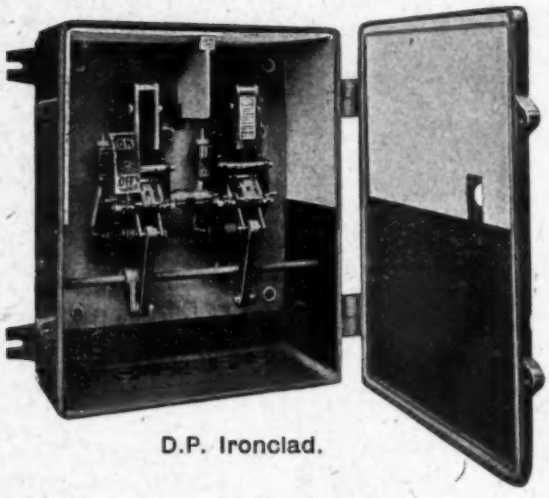

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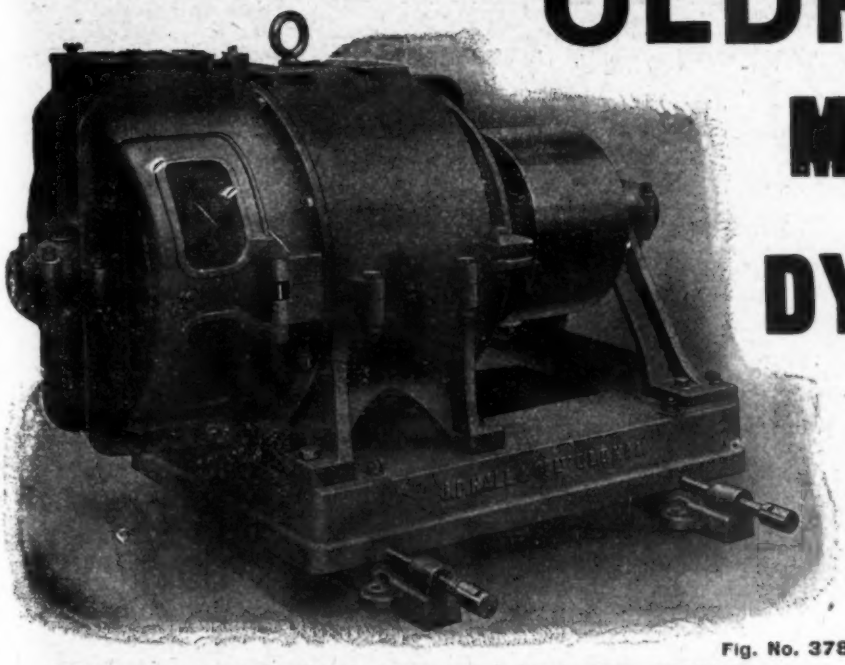

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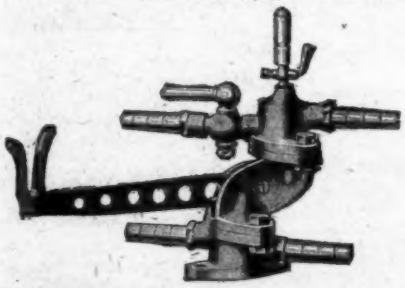

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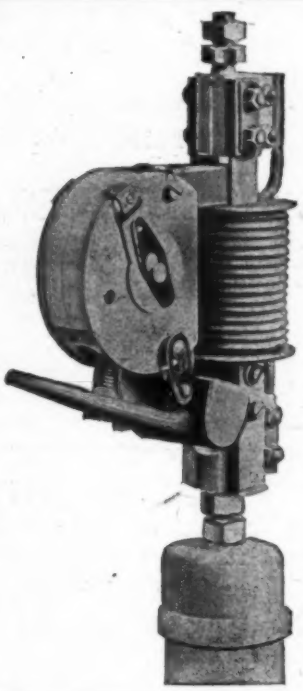

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TURNS, TAPS AND DRILLS.

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Patents and Alien Enemies.—Application has been made to the Board of Trade to avoid or suspend Patents No. 26,436/07, granted to Bosch for sparking plugs, by Messrs. Howard S. Cooke and Co., and No. 5,026/12, granted to Hubers (Pintsch A.-G.), by the Cosmos Lamp Works, Ltd. Applications have also been made for licences under applications vested in the Custodian in respect of Patents Nos. 16,620/14, and 109,298, applied for by the Pintsch A.-G., for metallic bodies, by the Cosmos Lamp Works, Ltd.

LIGHTING AND POWER NOTES.

Argentina.—E.L. Schemes.—A local company is being formed at Laprida (Province of Buenos Ayres) for the installation of electricity in the town. A concession has been granted to Senor Facundo Escalera for the installation and working of a power house at Cosquin (Cordoba). The residents of Santa Elena (Buenos Ayres) have decided to install an electric lighting scheme in the town.—*Review of the River Plate*

Australia.—E.L. Schemes.—The Queanbeyan (N.S.W.) Council is taking steps to borrow £20,000 for the purpose of installing an E.L. system; the Mittagong (N.S.W.) Council is endeavouring to borrow £5,000 for the same purpose; arrangements have been made by the Dunmunkle (Victoria) Shire Council to light the towns of Murtoa and Minyip with electricity.—*Tenders.*

Ayr.—Price Increase.—The T.C. has increased the charges for electricity for all purposes to 50 per cent. above pre-war rates.

Beccles.—Proposed E.L.—The Public Lighting Committee proposes to discuss the question of an electric lighting scheme for the town at its next meeting.

Canada.—Water Power.—The Hydro-Electric Power Commission has given notice of its intention to spend $1,250,000 in the erection, at Ranney's Falls, Campbellford, of a power plant that will produce from 8,000 to 10,000 H.P. It is stated that the work will begin this autumn.

Chorley.—Workhouse Lighting.—The B. of G. has decided to apply to the L.G.B. for sanction to carry out improvements at the workhouse, including the installation of electric light plant.

Continental.—Belgium.—The daily Press states that, among other things, the Germans succeeded in destroying the gas and electricity plant at Ostend before they left the town.

Italy.—The Consiglio Superiore delle Acque has expressed itself in favour of the scheme of the Società Elettrica della Sicila Orientale for the use of the waters of the Alcantara basin for generation of electricity. The scheme provides for the construction of an artificial lake of 66 mill. cb. m. capacity on the Flaxio torrent, about 1,200 m. above sea level, which, by means of an underground conduit, will convey its waters to a second artificial lake on the Alcantara, 1,135 m. above sea level, having a capacity of 24 mill. cb. m. In all, 30 mill. cb. m. of water will be stored and used. The water dammed will create a fall of 440 m., capable of giving continuously 4,200 H.P. This scheme is expected to lead to the development of industries in the Catania and Messina regions and the electrification of the Catania—Palermo railway system, as also to the utilisation of electricity for agricultural purposes.—*Annali d'Ingegneria e d'Architettura.*

Switzerland.—The electricity works now being built at Mühleberg, and belonging to the Berne Electric Power Co., will obtain its power from the section of the river Aare, between the Felsenau works and the junction of the river Saane with the Aare. The illustrations and plans given in the *Schweizerische Bauzeitung* show that the works was well advanced in July, 1918, and it forms the last section for the power development of the Aare between Berne and the Bielersee, the other finished works being those at Felsenau, Kallnach, and Hagneck. Under average conditions there is a volume of water of about 100 cb. m. per second, with a fall of 19 metres. A weir has been constructed across the river forming a storage reservoir, which holds up 9 million cb. metres of water. The turbine house has accommodation for eight groups of machinery, each developing 8,100 H.P. The weir is designed to pass 500 cb. m. per second, which is the greatest high-water capacity of the river, without causing the water-level up-stream to rise above the calculated level of 484·2 m. Part of the generators are built for three-phase current and part for single-phase, and there will be two transformers, each for 5,000 K.V.A. The turbines are of the vertical spindle, single row, high-speed type, by Messrs. Escher & Wyss, of Zurich, and run at 133 to 166 R.P.M., with a frequency of 40 or 50 cycles per second. The switchboard and transformer plant is all placed in a separate building on the left bank of the river. The weir itself forms a bridge, thus affording a long-needed connection between the two banks of the river. It is expected that the works will be completed in 1920.

Sweden.—Among the concerns recently formed to establish small electric lighting stations, or to distribute electricity obtained from the large bulk supply undertakings, are the Beskvarns Kraftstation Aktiebolag, organised at Nashult: the Pengsjo Elektrisk Kraft Aktiebolag, formed at Pengjso; and the Haggenas Elektriska Aktiebolag, registered at Haggenas. A company has been formed at Maffmar, with a maximum capital of £25,000, and the title of Hallens Elektriska Aktiebolag, to establish a plant to utilise water power in the Dammen district for the generation of electricity.

Dover.—Price Increase.—The T.C. has advanced the price of electricity for power to 3½d. per unit, and for heating to 2½d., as from October 1st last. Application has been made to the B. of T. for permission to increase the charge for lighting to 8d. per unit, and for the maximum charge of 11s. 8d. for energy used up to 20 units to be increased to 15s., and 9d. per unit beyond.

Dublin.—Price Increase.—The Corporation has increased its charges by 1d. per unit for lighting and 1½d. per unit on the existing scale for power.

Liffey Water Power Scheme.—The Pembroke U.D.C. has resolved to support the scheme of the Dublin and Lucan Electric Railway Co. to generate electricity from the river Liffey, for railway and general industrial purposes.

Exeter.—Workhouse Lighting.—The Building Committee of the B. of G., after receiving specifications and estimates for installing electric light in the remaining blocks at the workhouse, has deferred consideration of the scheme.

Glasgow.—New Sub-stations.—In view of the early generation of electricity at Dalmarnock station, a Special Committee of the Electricity Committee has considered the advisability of acquiring ground for additional sub-stations. The chief engineer has reported that extensions of the Whitevale and Springburn sub-stations and new sub-stations at Possilpark and Polmadie are now urgently required. For the purpose of providing a new sub-station for the Central District, ground is to be acquired at a cost of £13,500.

Electric Welding.—In connection with the proposal by the Admiralty Welding and Labour-Saving Division to start schools in various shipbuilding centres for the training of electric welding operators, premises at the T.C. electricity works at Partick have been let, the lessees to provide the entire fitting up of the premises, including welding equipment and power wiring.

Halifax.—New Generating Station.—In compliance with the request of the Government for municipalities to prepare schemes for public works which will be required after the war, the Electricity Committee has instructed the borough electrical engineer to prepare plans and specifications for a new generating station to be erected at Copley. The matter is the subject of much local controversy, and the decision, which was passed by a majority of one vote, may be reversed by the Town Council.

Iceland.—Water Power.—The Iceland Telegraph Bureau announces that a company at Reykjavik has decided to erect hydro-electric works for the utilisation of the Ellida River, 4·34 miles from that city. The expenditure is estimated at 7,000,000 crowns, and the work is to begin at once.

Ireland.—Lighting Restrictions Order.—The Irish Lighting Restrictions Order, sanctioned by the Viceroy, provides for the prohibition of all shop window and outside lighting; the closing of all offices, warehouses, and shops at 5.30 p.m. on four days per week, 7 p.m. on Fridays, and 9.30 p.m. on Saturdays, with certain exceptions, which must not consume more than 50 per cent. of the energy used for lighting in 1914, and the prohibition of the cooking of meals in hotels after 8 p.m. Private premises, other than shops, factories or warehouses, are allowed two-thirds of the lighting used before the war. Factories are to have the preference of electricity and gas for power purposes, but factory lighting is to be limited to 80 per cent. of that of 1914, except by special permit. Outdoor lighting at places of amusement is prohibited, and they are to close at 10.30 p.m. Public lighting is not to exceed 50 per cent. of that of 1914.

India.—At the last annual meeting of the Calcutta Electric Supply Corporation, the chairman stated that during the year the supply had to be curtailed in order to economise boiler power, and because bitumen and other materials required for extensions were unprocurable. Their coal contracts had been cancelled, and they were doing the best they could with such coal, both as regards quantity and quality, as Government permitted to be delivered to them. A scheme had been approved for gradually changing sections of the overhead mains to underground, but owing to lack of material the work had to be postponed.

Linthwaite.—Street Lighting.—At the conclusion of the war the U.D.C. has decided to discuss with the Huddersfield Corporation electrical engineer the question of street lighting with electricity.

London.—Stoke Newington.—Price Increase.—The E.L. Committee has recommended the B.C. to adopt the following revised charges for electricity:—Power supply during day-time, from 2d. to 3d. per unit., and 10 per cent. increase on power charges generally; the abolition of all discounts under scales A, B, and D, and under special agreements; and the abolition of the rebate to lighting consumers, whereby the average charge was limited to 4½d. per unit.

Bermondsey.—Year's Working.—The annual accounts of the B.C. electricity department show that the total expenditure for the past year was £36,381, whilst the income amounted to £51,140. After paying capital charges (£13,973), the net surplus was £1,185, to which was added £1,133 transferred from the general fund of the Council in connection with allowances to employés with the

Forces. The total deficit now stands at £9,823; 6,550,260 units were sold during the year, including 237,436 for public lighting.

Kensington.—It is stated that the reports of the inspectors to the Electric Supply Co. show that since October 1st there has been a decrease of 20 per cent. in the consumption of electricity, compared with the corresponding period last year. About 80 per cent. of the electricity generated by the company is for lighting purposes. This figure understates the measure of household economy, it is stated, inasmuch as there has been an increased demand for power purposes.

Mytholmroyd.—Prov. Order.—Having received a draft of the Electrical Distribution of Yorkshire's E.L. Bill, and a request for the consent of the Council to the same, the U.D.C. has referred the company to the resolution in which it decided to oppose the application.

Paraguay.—Owing to an accident at the power house at Asuncion, the whole of the electric lighting and tramway services in the city were suspended from August 24th to August 29th last; several daily papers were also forced to cease publication.—*Review of the River Plate.*

Sheffield.—At a meeting of the T.C., the chairman of the Electricity Committee laid before the Council the position as to the Blackburn Meadows power station. Having convinced the Ministry of Munitions as to the urgent need for the provision of a large additional supply of electric power for war purposes, the Council commenced the erection of a new power station, and placed orders, as authorised by the Ministry, for the necessary plant. Recently the Ministry recalled its promise to acquire this plant, and, in his opinion, the Council was placed thereby in a most serious position. The present plant was most inadequate to meet the demands upon it for munition purposes. It was being run to an extent considerably beyond its proper capacity, and he feared that a serious breakdown might take place at any time. Even if the supply proposed to be given by the Rotherham Corporation was available—and this certainly would not be the fact for several months yet—the supply would not be adequate to meet outstanding requirements. The Council authorised the Lord Mayor to take such action in the matter as he might think fit.—*Sheffield Telegraph.*

Spenborough.—Price Increase.—The U.D.C. has increased the net price of electricity as from November 1st by 25 per cent.

Wolverhampton.—Proposed Loan.—The T.C. has decided to apply to the L.G.B. for permission to borrow £10,000, in order to bring the contingency amounts in certain loans to 11 per cent. of the total of such loans.

TRAMWAY AND RAILWAY NOTES.

Argentina.—Strike.—At the beginning of September a general strike took place in Cordoba, and spread to Buenos Ayres and Jujuy. After the whole of the public services had been suspended for a week, most of the demands were acceded to or referred to arbitration, except in the case of the tramway employés at Cordoba, who refused to resume work until their demands were granted.—*Review of the River Plate.*

Australia. — N.S.W. — Australia's "greatest electric railway system" serves a large area in and around Sydney. The system comprises 350 miles of track, 1,387 motor-cars, 11 trailers, and 105 service cars. Between 4,000 and 5,000 cars pass the centre of the city between 6 a.m. and 12 midnight. Some of the gradients on the Spit-Manly section, where the lines rise from sea level to the top of the cliffs, are so steep that a dummy truck has to be used to pilot cars up and down. The track supply is 600 volts, D.C., overhead, and there are three generating stations and several sub-stations. More than 295 million passengers are carried per annum, and the car-mileage exceeds 25 million miles.

Birmingham.—Fuel Economy Bonus.—To encourage the drivers to reduce the consumption of power, the Tramways Committee has offered a monthly bonus of 50 per cent. of the value of the energy saved.

Dublin.—Wages.—As the result of an arbitration held by Sir Plunkett Barton, the male employés of the Dublin United Electric Tramways Co. have been granted an increase of 5s. per week in wages from September 1st, making a total of 23s. per week on pre-war wages.

Large Trolley Wheels.—The Oakland, Antioch, and Eastern Railway is obtaining excellent service from various makes of 10-in. trolley wheels. Formerly 6-in. wheels were used, and with a trolley pole pressure of 35 to 40 lb., these often gave a life of only 90 miles. With the 10-in. wheels the pole pressure can be reduced to 25 or 30 lb., a life of 6,000 miles or more is obtained, and dewirements and pole troubles are reduced.

Lancashire.—Wages.—Through the Transport Workers' Federation, the employés of the Lancashire tramway systems are asking for a further 10s. per week for men and 17s. per week for women. This would bring the war wages up to 35s. per week for workers over 18 years of age, and would be equal pay for men and women. The suggested basis of employment is a six-day week of 10 hours a day. For time worked over 10 hours a day and under 12 time and half rates are asked, and double pay for time worked over 12 hours a day. The last award was made four months ago, and its terms prohibited the reopening of the question for that period. The matter was brought before the Lancashire and Cheshire Authorities Joint Committee last week, and referred to the Municipal Tramways Conference Executive.

London.—L.C.C. Pays Damages.—Judge Parry, at the Lambeth County Court, last week, awarded Mrs. A. E. Hearn £175 damages, with costs, for injuries sustained in a collision between two L.C.C. tramcars at Greenwich, on February 6th. The plaintiff was on her way home from work when the two tramcars collided, throwing her off the seat; she sustained severe injuries. The L.C.C. did not dispute the liability, but maintained that the claim was inflated.

Fuel Economy Bonus.—The L.C.C. Tramways Department has distributed £1,614 among the drivers and conductors, representing half the amount saved on the fuel account for the quarter ended September 25th last; the amount of coal saved amounted to 1,175 tons, or nearly 5 per cent. of the average consumption.

Accident.—By a tramcar collision at Kennington, on Saturday, a conductor was injured.

Proposed Fares Increase.—Brentford District Council is seeking to combine the local authorities of the Thames Valley into an opposition to the proposal of the L.U.T. Co. to ask for an order empowering it to raise its fares. When the company sought its recent Bill this power was asked for, but was withdrawn. The proposal now is to charge 1d. per mile, with ½d. per mile for workmen's fares, which would about double the present fares.

The T.C.'s of Wimbledon and Kingston and the Surbiton U.D.C are urging the Board that in no case should the fares be advanced more than 50 per cent.

New Zealand.—Electric Vehicles.—The Christchurch City Council has placed a contract with the New Zealand agents for Edison electric motor vehicles, whereby it undertakes to sell annually, within a radius of 20 miles of the city, and at a moderate commission, a minimum of 12 electric vehicles. The Council incurs no liability for failure to dispose of the total number agreed upon, but the agents have the right to cancel the agreement in such an eventuality. The reason for entering into the arrangement is that the probable increase in the number of electromobiles will find profitable business for the municipal electric power station, which can charge the vehicle batteries in the "off" hours of the day, when the energy costs practically nothing. This is possible under the system of charging adopted by the Public Works Department, which supplies from the Lake Coleridge hydro-electric station. The charge is based on the peak load, and whatever the maximum demand may be at any time of the day the city is charged for that quantity as if it had been used continuously for the whole 24 hours. Therefore in the slack hours, when there is no danger of increasing the peak load, the Council can charge an extremely low rate.

Oldham. — Proposed Extensions.—The Tramways Committee proposes to construct a new route to the new factory in the Chadderton district.

Taunton.—Electric Vehicle.—The T.C. has referred back to the Health, Streets, and Highways Committee a recommendation to purchase an electric vehicle, at a cost of £1,300.

TELEGRAPH AND TELEPHONE NOTES.

A Cable Monopoly?—A German report states that an Anglo-American syndicate has presented to the Allied Governments proposals for the establishment of a world-wide cable monopoly.

Holland.—As reported recently in this column, an agreement has been entered into between the Dutch Government and Herr Bredow, representing the Telefunken Co., for the erection of a station in Holland for direct connection with other countries, particularly Netherlands Indies. It is now stated that the station is to be similar to that at Nauen, near Berlin, and is to permit also of communication with North and South America. It is said that great political importance is attached to the agreement in Holland, as it will enable the country to liberate itself from English control in transmarine telegraph services.

India.—Telephonic communication has recently been established between Bangalore and Mysore, a distance of 87 miles.

Swedish Telephone Merger.—A Swedish trade journal reports the consolidation of the Aktiebolaget L. M. Ericsson and Co. and Stockholms Allmänna Telephone Co., in order to meet expected competition and possible business extensions after the war. The former company mainly manufactures telephone instruments and materials, while the latter installs and maintains the wires, and also has concessions for wires in other countries.

As competition sometimes arose between these two, a new com-

pany was organised to take over both companies' interests in Russia, and has installed a large number of telephone wires there. The Russian Government has taken over the wires without as yet granting compensation, the question still being under consideration.—*T. and T. Age.*

CONTRACTS OPEN AND CLOSED.

OPEN.

Australia.—Queensland. November 29th. Electric lifts for the Department of Public Works, Brisbane.—*Industrial Australian and Mining Standard.*

Bedford.—November 13th. Two water-tube boilers, mechanical stokers, and induced-draught plant for the Corporation. See "Official Notices" October 4th.

Dublin.—November 7th. Gt. Northern Railway Co. of Ireland. Six or 12 months' supply of stores, including various electrical items. See "Official Notices" October 18th.

London.—October 25th. H.M. Office of Works. Electric cable. See "Official Notices" October 18th.

South Africa.—Johannesburg.—November 27th. Municipal Council. 2,000 copper ribbon bonds, and 2,000 copper solid bonds (Contract No. 424). A copy of the specification can be seen at the Inquiry Office of the Department of Overseas Trade (Development and Intelligence), London.

York.—November 1st. N.E. Railway Co. Telegraph apparatus, wire and line stores for 6 and 12 months. See "Official Notices" to-day.

CLOSED.

Australia.—Sydney.—Electricity Committee. Recommended :—

One set of spare coils and insulating material for the 2,000-k.v.a., 33,000/5,000-volt transformers installed at the power house and abattoirs sub-station, £269.—British Westinghouse E. & M. Co., Ltd.
Spare parts for stoker gear, £185.—Babcock & Wilcox, Ltd.

Melbourne.—Electricity Supply Committee. Accepted :—
Porcelain insulators, £131.—Australian Porcelain Co., Pty., Ltd.
2,400 gas-filled metal-filament lamps, £2,020; 1,500 Goliath Edison screw-holders, £328.—Australian General Electric Co.
Electrically-driven hoist, £255.—G. S. Morrison.

P.M.G.'s Department, Queensland :—
One mile silk and cotton-insulated, lead-covered switchboard cable, 4 pairs, £85; 1,490 do. do., 25 pairs, £246.—B. I. & Helsby Cables, Ltd.

Commonwealth Railways :—
Electrical spares, Port Augusta, £299.—I.R., G.P. & Telegraph Works Co., Ltd.

Victorian Railways Department :—
Switches, for remote control, £50 each.—Electric Equipment Mfrs., Pty., Ltd.

—*Tenders.*

Government Contracts.—List of new contracts placed in September, 1918 :—

War Office.

Dynamos.—H. T. Boothroyd, Ltd.; Phœnix Dynamo Mfg. Co., Ltd.
Fans.—General Electric Co., Ltd.
Generating sets.—R. A. Lister & Co., Ltd.
Magnetos.—Fellows Magnetos Co., Ltd.
Motors, &c.—E. Brook, Ltd.; General Electric Co., Ltd.
Insulator pins.—Bullers, Ltd.
Switchboards.—British Westinghouse E. & M. Co., Ltd.
Insulating tape.—British Rubber Manufacturers, Ltd.
Iron and steel wire.—Duke, Waring, Crisp & Co.; J. Lysaght, Ltd.; J. Rigby & Sons; J. Royston & Co., Ltd.; Rylands Bros., Ltd.; Shropshire Iron Co.; J. Smith, Ltd.; Standard Wire Co.; Tyne Wire Weaving Co., Ltd.

Post Office.

Repairing wire apparatus.—J. Barker & Co., Ltd.; George Plumpton, Ltd.
Telegraph apparatus.—Automatic Telephone Mfg. Co., Ltd.
Telephone apparatus.—Automatic Telephone Mfg. Co., Ltd.; B.I. and Helsby Cables, Ltd.; British L.M. Ericsson Mfg. Co., Ltd.; Peel-Conner Telephone Works, Ltd.; Western Electric Co., Ltd.
Testing and protective apparatus.—British L.M. Ericsson Mfg. Co., Ltd.
Submarine cable.—Telegraph Construction & Maintenance Co., Ltd.
Telegraph and telephone cable.—B.I. & Helsby Cables, Ltd.; General Electric Co., Ltd.; Hackbridge Cable Co., Ltd.; Henley's Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Siemens Bros. & Co., Ltd.; H. W. Smith & Co., Ltd.; Telegraph Construction & Maintenance Co., Ltd.; Yorkshire Cable Co., Ltd.
Dry cells.—Siemens Bros. & Co., Ltd.
Secondary cells.—Pritchett & Gold and Electrical Power Storage Co., Ltd.
Cords for telephones.—London Electric Wire Co. & Smiths, Ltd.; Peel-Conner Telephone Works, Ltd.
Insulator bodies and covers.—J. Bourne & Son, Ltd.; Bullers, Ltd.; Doulton & Co., Ltd.; J. Macintyre & Co., Ltd.
Terminal irons.—McGregor Bros., Ltd.
Glow lamps.—British Thomson-Houston Co., Ltd.; Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.
Fuse mountings.—H. White & Co.
Telegraph spring ratchets.—H. Brindley.
Rings for insulator spindles.—Rubber Co. of Scotland, Ltd.
Zinc rods.—Eyre Smelting Co., Ltd.
Telegraph spindles.—Bayliss, Jones & Bayliss; Bullers, Ltd.; Guest, Keen and Nettlefolds, Ltd.; J. W. Leach, Ltd.
Four wire strainers.—S. Venables & Son, Ltd.
Telephones.—British L.M. Ericsson Mfg. Co., Ltd.; Peel-Conner Telephone Works, Ltd.
Bronze wire.—B.I. & Helsby Cables, Ltd.
Enamelled and silk-covered copper wire.—London Electric Wire Co. and Smiths, Ltd.
Flame-proof wire.—London Electric Wire Co. & Smiths, Ltd.; Western Electric Co., Ltd.
Galvanized iron wire.—Shropshire Iron Co.
Installation of water pumping plant at the Mount Pleasant Station of the P.O. (London) Railway.—Brightside Foundry & Engineering Co., Ltd.
Repair of battery at Manchester (city) telephone exchange.—Pritchett and Gold and Electrical Power Storage Co., Ltd.

India Office, Store Department.

Cable.—C. Macintosh & Co.
Insulators.—Bullers, Ltd.; Taylor, Tunnicliffe & Co., Ltd.
Wire.—B.I. & Helsby Cables, Ltd.; Shropshire Iron Co., Ltd.; Dorman, Long & Co., Ltd.

Hammersmith.—Electricity Committee :—

800 yd. ·25 in. and 880 yd. ·1 in. extra-high-tension cable.—**Callender's Cable & Construction Co., Ltd., £942** (recommended); Johnson and Phillips, £944; W. T. Henley's Telegraph Works Co., Ltd., £948; Siemens Bros. & Co., Ltd., £967.
80 coal elevator buckets.—**Aland & Co., £100** (recommended); E. Allen and Co., Ltd., £125; W. B. Bawn & Co., Ltd., £80; C. A. Harvey and Co. (London), Ltd., £64.
540 lap welded air heater tubes.—J. Howden & Co., Ltd., £260; Stewart and Lloyds, Ltd., £217; **J. Wilson (London), Ltd., £217** (recommended.)

Taunton.—Electricity Committee :—

2,600 tons of coal, 38s. 6½d. per ton.—Cory Bros. & Co., Ltd.

Wolverhampton.—T.C. :—

Piping.—Staveley Coal & Iron Co., £17 10s. and £27 10s. per ton.
Valves.—J. Hopkinson & Co., Ltd., £179.
Repairs to canal boats.—J. E. Perry & Sons, £166.
Traversing conveyor.—Gibbons Bros., £367, plus 10 per cent. for contingencies.

Additional payments in respect of contracts owing to revision of labour rates have been granted as follows :—

Strachan & Henshaw, Ltd.—Telpher machines and coal grab, extra £64.
Stirling Boiler Co., Ltd.—Three boilers, extra £538.

The Council has accepted the offer of F. Gilman for the purchase of the 300-kw. reciprocating set at the destructor works, for £1,150.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, October 25th. At 7.30 p.m. At 20, Victoria Street, S.W. Paper on "Cooling Towers," by Mr. J. Elliott. **(North-Eastern Section.)**—Tuesday, October 29th. At 7.15 p.m. At the Mining Institute, Newcastle-on-Tyne. Paper on "Coal and Ash Handling Plants," by Mr. N. Thorton.

Manchester Association of Engineers.—Saturday, October 26th. At 6.30 p.m. At the Grand Hotel. Paper on "Fuel Oil and its Application," by Mr. A. F. Baillie.

Industrial Reconstruction Council.—Wednesday, October 30th. At 4.30 p.m. At Saddler's Hall, Cheapside, E.C. Lecture on "The Functions of the Government in Relation to Industry," by Mr. W. L. Hichens.

Salford Technical and Engineering Association.—Saturday, November 2nd. At 7 p.m. At the Royal Technical Institute. Members' short papers for the Larmuth Gold Medal.

NOTES.

Water Power from the Dee.—In the course of a lecture on the utilisation of water power, read before the Aberdeen Rotary Club, Mr. C. H. Roberts stated that the River Dee represented about 50,000 H.P.; but this was not directly available. From the tributaries of the Dee, however, water power could be profitably obtained; about 15,000 E.H.P. could be made available at Ballater during a 12-hour day, and 2,000 to 3,000 E.H.P. at Banchory.

Irish Coal Mines.—It is announced that the Irish Coal and Lignite Co., Ltd., is about to commence operations in County Tyrone at an early date. Systematic borings will be made at Coalisland and in the country between that town and Lough Neagh, under which both coal and lignite exist, it is believed. About £5,000 will be spent in this way, before shafts are sunk, to prove the existence of coal in paying quantity. The Tyrone coal burns with an intense heat and largely is of a good quality, some of the Coalisland seams being equal to Wigan coal. With regard to the lignite, operations are to be started at once, the machinery, if not actually *in situ*, being on the way from London. Mr. Bath, the engineer of the undertaking, at great personal risk, obtained details of the secret process of converting lignite into coal substitute in Germany. The lignite will be separated from its bed by a rotary cutter, taken to an elevatof, treated by the secret process and pressed into briquettes—10 × 5 × 3 in.—and will be ready for use within three hours. It is estimated that the machinery will be capable of turning out from 10,000 to 15,000 tons of briquettes per week. The deposits of lignite round Lough Neagh are very extensive, and other deposits exist in County Antrim, County Derry, &c.

The Eight-Hour Day.—According to the *Manchester Guardian*, the demand put forward by the Engineering and Shipbuilding Trades Federation for a 44 hours' working week without reduction in wages and on a one-break per day system, to come into operation on the cessation of war, has been considered by the shipbuilding employers, who have replied accepting the principle of a shorter working week, without, however, committing themselves to any definite number of hours. Negotiations are proceeding jointly with the Engineering Employers' Federation, and it is expected that conditions will shortly be agreed on which will economically safeguard the industry.

Electric Welding Operators.—The Admiralty proposes to start schools in various shipbuilding centres for the training of electric-welding operators.

Volunteer Notes.—Royal Engineers (Vols.), London Army Troops Companies.—Headquarters: Balderton Street, Oxford Street, W. 1.

Corps Orders No. 44, by Lieut.-Colonel C. B. Clay, V.D., Commanding.
Captain of the Week.—Capt. W. Hynam.
Next for Duty.—Capt. W. Darley Bentley.
Sunday, October 27th.—Commandant's Parade for work, "Obstacles," at Esher. Parade Waterloo Station, 9 a.m. Drill order. Great coats. Mid-day and tea rations to be carried.
Monday, October 28th, to Saturday, November 2nd.—Drills as usual.

C. Higgins, *Capt.* R.E., *Adjutant.*

We are informed that the Corps is in a highly efficient condition, as shown by the Inspection Reports, but, owing to the alteration in military age and other causes, the numbers are considerably below the establishment. Although the Corps is under the control of the War Office, the Government funds are quite insufficient to maintain it on a satisfactory basis, and at present it is supported mainly by subscriptions from members.

In an Engineering Corps there are many expenses that do not occur in the case of Infantry, and the good work which the Corps is doing justifies us in appealing to our readers for assistance to its funds. Up to the present 800 men from the Corps have joined H.M. Forces, and of these 300 have accepted commissions. It is estimated that the sum of about £400 is required to run the Corps satisfactorily, and of this amount at present about £130 can be regarded as assured. A pamphlet explaining the work of the Corps, as well as explanatory leaflets, can be obtained at Headquarters, Balderton Street, Oxford Street, W. 1.

A smoking concert is to be held to-morrow (Saturday) evening, at the Regent Street Polytechnic, at 7.30 p.m.

British Oil.—Near the village of Hardstoft, six miles from Chesterfield, machinery for drilling for oil was set in motion on October 15th by Lord Hartington, the owner of the estate. This is the first organised attempt to obtain free oil by drilling in the United Kingdom. There are about 40 American drillers with machinery to drill 10 wells, seven sites being already chosen near Chesterfield.

According to the daily Press, home oil-boring produced contention in the House of Lords on October 22nd. A Government Bill from the House of Commons, introduced by Lord Elphinstone, provided that no person should bore in the United Kingdom except on behalf of the Government. A private Bill by the Duke of Northumberland empowered any person who could obtain a licence to bore. He thought the Government Bill set up a monopoly for Messrs. Pearson (Lord Cowdray's firm), and urged the rights of other prospecting firms and landowners. The Duke of Buccleuch said it was impossible to resist the belief that if Messrs. Pearson received preference now they would retain it after the war. Both Bills were accorded a second reading, but the Government one will go to Committee as soon as the Government pleases, while the other one must take its chance.

Accidents in Mines.—About 120,000 men employed at mines were granted compensation during 1917 for injuries received while at work. The great majority of the cases were underground. —*The Times.*

The "Key" Industries Exhibition.—We are informed that the Exhibition has met with success exceeding even the sanguine expectations of its organisers, the Industrial Section of the Tariff Reform League. Between 70,000 and 80,000 persons visited the Exhibition during the short time it was open, or an average of about 5,000 daily, and it has been widely and favourably commented on by the Press of all shades of political opinion. The educational advantages of such an object-lesson in the national value of "key" industries, and the dangers involved in foreign control of such industries, have therefore been very generally appreciated, and Mr. H. J. Mackinder, chairman of the League, makes an earnest appeal for national and non-party support in meeting the demands which reach him from many quarters that other cities of the United Kingdom should be afforded the opportunity of seeing what London has seen. The expense of the Exhibition has necessarily to be met by voluntary contributions to the funds required. That expense, especially in existing conditions, is very heavy, and as the Exhibition is opened free to the public, and no charge is made upon exhibitors for space, the organisers of the Exhibition look to those interested in the success of the undertaking for help in meeting the expense involved.

So far as the expense incurred in London is concerned, generous support has already been assured by many of the great firms who have helped with exhibits. The League, however, desires to raise a substantial fund for the purpose of showing the Exhibition in the various large industrial centres throughout the country. Cheques and postal orders should be made payable to Mr. Edward J. Duveen (Chairman of the Industrial Section of the Tariff Reform League), and crossed "Key Industries Exhibition."

The Batti-Wallahs and the Huns.—At the monthly luncheon of the Batti-Wallahs' Society, on Monday, Mr. C. H. Wordingham (Director of Electrical Engineering, Admiralty, and President of the Institution of Electrical Engineers) said he had been asked to attend and address the members on the subject of Germans. He always had an intense loathing for anything German. His instinct against the Germans was very strongly developed. The German was essentially a thief, and was dishonest in his bargains. Many of those who had bought German plant had found to their cost what the German's idea of a contract was. He hoped also the bestiality and horrible cruelty of the German would not be forgotten. No part of the German nation, from the scientists downwards, had dissociated itself from the acts of which the Germans had been guilty. We could not afford to have contempt for the Germans, however much we despised their character. The moment the war was over we should be assailed again by the German, who would take advantage of another failing of the Englishman, who was apt to take the article that cost 19s. 11½d. rather than the British-made article that cost £1. Years before the war, he (Mr. Wordingham) had made a practice of asking whether an article was made in Germany or not. He hoped the propaganda which he understood the Society had started against the Germans would result in bringing Englishmen to see how vile the Germans had been, and to be determined that they would no more have dealings with them than they would allow their sons and daughters to sit down with pickpockets, burglars, and murderers. Our children should be taught about the conquest of the Germans, and warned against their evil character. A boycott of the Germans had always seemed to him a simple remedy. If every Englishman were determined never knowingly to buy anything from a German, no legislation would be needed. He would like to see the Germans precluded from trading with any of the Allies or Neutrals. He could not understand why a high opinion of the German had been entertained. They were very fond of getting hold of other people's brains and exploiting them to get trade for their country.

Mr. F. Pooley (hon. secretary) gave some information regarding the steps taken by the Committee in regard to the matter under discussion, and intimated that further details would be given at a luncheon which would take place after further communication with the Merchant Seamen's League.

Fatalities.—A boy, aged 12, son of a Hamsterley collier, climbed an electric light pole in the street to place his cap on top. He touched a live wire, and received a 220-volt shock, which instantly killed him. A miner who tried to release his body was burned on the hands.

When taking a short cut to his home along the electric railway a man stepped on the live rail near Pinner and Hatch End Station and was killed.

Pulverised Coal Systems in America.—Mr. Leonard C. Harvey, of Red House, Malden, Surrey, has returned from the United States, after having carried out for the Director of Fuel Research a full investigation into the progress made in recent years in the application of pulverised coal for metallurgical and general industrial purposes, for steam raising in land and marine boilers, and in locomotives on railways. The purpose of the Director of Fuel Research, in accepting Mr. Harvey's offer to make this investigation, was that the most recent information on the subject of pulverised fuel should be available to all who are interested in the more scientific use of fuel.

In order that effect may be given to this intention, the information and data collected by Mr. Harvey, together with descriptions of numerous installations inspected and statements as to the actual experiences of the owners of these installations, are now being collated in the form of a report. This report will be issued as a Government publication by the Department of Scientific and Industrial Research at an early date.

Important developments have taken place in America in the utilisation in pulverised form of low-grade coals of high ash contents, and it is hoped that similar developments will follow the adoption of the system in this country. It is possible that in this way considerable quantities of material, which is at present regarded as waste at the coal mines, may ultimately be made available as fuel, and thus supplement the restricted supplies of coal.

An Electric Speedometer.—A speedometer which is intended for measuring boat speeds has been patented by Mr. R. W. E. Moore, says the *Electrical Review*, of Chicago. It comprises a thermo-couple immersed in the water; one junction is kept at constant temperature, and it is claimed that the difference between the temperatures of the junctions then measures the speed of the boat.

Institution and Lecture Notes.—Institution of Mechanical Engineers.—At the meeting on Friday last, Prof. C. A. Edwards and Mr. F. W. Willis read a paper on the resistance to penetration of metals when tested by impact with a 10-mm. steel ball, and showed that their investigation led to a new hardness scale in energy units. The method of testing eliminates the effects of time and degree of deformation, and is superior to the Brinell and scleroscope tests.

Mr. R. G. C. Batson also read a paper on the static and impact methods of testing, and Dr. W. C. Unwin discussed the Ludwik hardness test, pointing out that the use of a truncated cone instead of a ball had material advantages.

Electrical Power Engineers' Association.—The smoking concert held by the Midland Division was very successful, the attendance numbering nearly one hundred. The chairman (Mr. Legge) spoke of the extremely rapid progress of the Association, which was so successful as to excite considerable jealousy in certain quarters. This deplorable situation was not desired or caused by the E.P.E.A. The next concert is provisionally fixed for Wednesday, November 6th.

A special general meeting of the Association was held on October 16th in the Royal Victoria Station Hotel, Sheffield. Mr. F. Langley, the chairman of the Sheffield and District Section, presided over a fully representative gathering. The president, Mr. A. L. Lunn, of Manchester, and one of the vice-presidents, Mr. R. C. Atkinson, of Leeds, addressed the members. A general review leading up to recent events was the topic of the evening;

also a brief account was given of the work of this Section, which was enthusiastically received by those present.

Institution of Automobile Engineers.—Among the papers to be read during the new session of the Institution is one on "Electric Vehicles," by Mr. Carl Oppermann, one of the pioneers of the electromobile in this country.

Institution of Electrical Engineers.—The following is the official programme of papers for the first half of the session 1918-19 :—

November 7th, 1918.—L. B. Atkinson, the Tenth Kelvin Lecture: "The Dynamical Theory of Electric Engines." (The premiums awarded for papers read or published during the past session will be presented at this meeting.)
November 21st.—J. H. Shaw, "The Use of High-Pressure and High-Temperature Steam in Large Power Stations."
December 5th.—Prof. Miles Walker, "The Supply of Single-Phase Power from Three-phase Systems."
December 19th.—P. Hunter-Brown, "Carbon Brushes: Considered in Relation to the Design and Operation of Electrical Machinery."
January 9th, 1919.—M. B. Field, lecture, "The Navigational (Magnetic) Compass as an Instrument of Precision."
January 23rd.—A. P. M. Fleming, "Planning a Works Research Organisation."

Keighley Association of Engineers.—At a joint meeting of the Association and the Keighley Textile Society, last Saturday evening, Mr. Thomas Carter, of Newcastle, gave an address on "Some Working Principles of Electrical Machinery."

Electrical Association of Australia.—At the meeting of the Victorian Section, on August 29th, a paper on "Automatically Controlled Sub-Stations and Power Stations" was read by Mr. G. G. Cree. After referring to the remotely controlled sub-station at Detroit, which has operated successfully since 1912, the author pointed out that a degree of protection had been attained, not only to the sub-station apparatus but also to the car equipments, excelling any that could be given by the most painstaking operator. It was practicable to dispense with the services of an attendant in the majority of railway sub-stations, and it was evident that the design of converting and distributing systems would be vitally affected by these new conditions of operation.

A comparison was made between the total distributing costs of an interurban railway, operated in the three following ways :—

1. Three 600-volt hand-controlled sub-stations.
2. Two 1,200-volt " " "
3. Six 600-volt automatically controlled sub-stations.

The ratio of total distributing costs, including all charges, worked out as follows :—

1.	600-volt hand-controlled	...	...	124
2.	1,200-volt hand-controlled	...	...	105
3.	600-volt automatically-controlled	...	...	100

Between systems one and three there was a saving of 117 tons of feeder copper.

In the automatic station the protective resistance is bridged in successive steps, so that after an overload has caused the insertion of the resistance, the trolley voltage is restored to its normal value gradually. With hand-controlled units, prolonged and therefore dangerous overload of the converters may result, but in the automatic stations the current-limiting devices have the effect of a drooping voltage characteristic, and as these come into operation assistance is automatically summoned from adjacent stations, and additional machines will be started there. The protection from overload which is afforded by these automatic machines will eventually lead to economies in the construction of the rotary converters which will compensate for the additional total cost of the smaller units involved.

A 300-KW., 25-cycle, synchronous converter is delivering power 25 seconds after the voltage relay drops. Even if an operator were on the alert, he would take much longer than this.

The energy required to start and connect a 300-KW. synchronous converter is only 0·5 KW.-hour. The running-light losses of this machine are 0·34 KW.-hour per minute, and would, therefore, in 1·44 minutes equal the energy required for starting.

In a hypothetical case, the energy saved by automatic operation is 32·5 per cent. with two-hour headway, and 13·3 per cent. with one-hour headway. Obviously the automatic sub-station is absolutely necessary for the economical operation of an interurban railway with a small number of cars per day.

At a recent meeting held in Sydney, a paper was read by Mr. R. C. Simpson on the subject of "Electrotechnical Education in New South Wales."

Appointments Vacant.—Chief electrical engineer, £650, for St. Helens Corporation electricity undertaking; electrical engineer and manager, £300, for Burgh of Stirling Electricity Department. See our advertisement pages to-day.

A Magdeburg Explosion.—Seventy persons have been killed and about fifty injured, owing to an explosion at the engine works at Magdeburg.—*The Times.*

British Metals Co.—It is stated in the Press that considerable progress has been made with the scheme for a £5,000,000 British Metals Co. to promote and develop Empire Trade in non-ferrous metals, and regain trade which had been taken by the German metal interests. Mr. A. W. Tait, of the British Aluminium Co., Ltd., is among those interested in the undertaking. The company is not yet registered, but £2,000,000 of the capital is understood to be forthcoming.

Swiss Suggestions for Dealing with Unemployment.—The following proposals for remedying unemployment, adopted by the Special Committee of the Bundesrat, are given in *Soziale Praxis* for September 12th :—"All wage-earning workers in private industrial undertakings, who make by piecework or otherwise less than 14 fr. per day, are, when out of employment, entitled to unemployment relief. The proprietor, if the activities of his factory are reduced, shall not dismiss workmen, but shorten the hours of work. If this shortening amounts at most to five hours per week, or 10 per cent. of the ordinary working hours, the proprietor is not bound to compensate the workmen for the lost time. If, however, this shortening amounts to 60 per cent. of the ordinary working hours, the proprietor pays, in addition to the normal wage for the work done, a supplement which, added to the wage, makes up, as maximum, 90 per cent. of the ordinary wage. If the shortening of working hours is more than 60 per cent., or if the concern is shut down entirely, the compensation to the workman for the period of unemployment will be paid in equal parts by the proprietor, by the canton where the workman is domiciled, and by the State. The workman is bound to accept any suitable work assigned to him, otherwise he forfeits his claim to an allowance. Disputes will be settled by an Arbitration Board, on which two independent persons and two representatives of employers and employés will sit."

Calorific Value of Kent Coal.—Some remarkable testimony as to the calorific value of Kent coal was given by the engineer of the Dover electricity works at a recent meeting of the Borough Council, when he stated that working results proved that its heating power was quite 10 per cent. above that of the Yorkshire coal which constituted the bulk of their consumption. Owing to the pronounced caking quality of the Kent coal they were unable to use it entirely, as it required more draught than they had at their command. It was therefore recommended that the boilers be equipped with a system of induced draught, the cost of which for each unit would be £735, against which the engineer estimated he could effect a saving of about £650 on his coal bill. The Council decided upon the immediate equipment of one boiler, as suggested by the engineer, the cost to be provided out of revenue, and it will apply for sanction for a loan to cover the cost of similarly dealing with the other three boilers. The caking properties of the seams now being worked at Snowdown and Tilmanstone largely account for the fact that local consumers have not used Kent coal to anything like the extent they might. The excuse has been that their stokers could not keep up the required steam pressure, and complained of the extra labour in firing. The first user on a large scale was the engineer of the Folkestone electricity works, who several years ago adapted his furnaces to the requirements of the local coal, paid the whole cost out of the savings on his first year's working, and has continued to save a very substantial sum on his yearly consumption ever since. Owing to the fact that so large a percentage of slack is being produced there has been a very general tendency to depreciate the value of the coal itself, but anyone acquainted with the facts knows that its calorific value is exceptionally high.—*Iron and Coal Trades Review.*

Engineering Labour Organisation.—It is no exaggeration to say that the reorganisation of the trade unions is one of the most important of all the problems of reconstruction. A hundred years ago trade unions were fighting for life itself against the power of the law. Fifty years ago their position was insecurely established. To-day they have taken their place in the governing forces of the country. They have played a great part in the conduct of the war; they will play a greater part in the future. Consequently their efficiency and their representative authority matter to the country scarcely less than the efficiency and the representative authority of the House of Commons. Unfortunately, in respect of organisation they are as much out of date as was the House of Commons before the new Reform Bill. There are numberless craft unions looking jealously at each other, and the relations of skilled and unskilled unions are profoundly unsatisfactory. Much of their labour and money is spent on the defence of small vested interests, to the neglect of vital issues. Unless some of these problems are resolved before peace they will enormously complicate the difficulties that will follow the demobilisation of the Army and the demobilisation of the civilian war-workers. We are glad, therefore, to see that a proposal to amalgamate the craft unions in the engineering industry is now before a big conference at York. Some thirteen unions are taking part, and they represent three-quarters of a million members. In no industry has the war been so disturbing an element, and reorganisation is consequently most urgently needed. Of this industry, therefore, we may say even more emphatically than of others that the man who makes one union grow where two unions grew before is a public benefactor.—*Manchester Guardian.*

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station and Tramway Officials.—The Huddersfield Tramways Committee has accepted, with regret, the resignation of Mr. R. H. WILKINSON, the tramways manager, who has received the appointment of manager of the Bradford City tramways. Mr. Wilkinson was thanked for his 14 years' services.

The Hackney B.C. Electricity Committee has had the salary of Mr. L. L. Robinson, the borough electrical engineer, under further consideration. It now reports that since the date of the previous report and recommendations the chief electrical engineers of Stepney, Poplar, and many other undertakings have had granted to them the war wages and bonuses in accordance with the various awards made to the technical staffs of such establishments by the Committee on Production. It is of opinion that Mr. Robinson should be treated in a similar manner, to take effect from the date when the several awards were made applicable to the Council's staff. At present the total amount of the awards is 23s. 6d. per week and 12½ per cent. on the amount of the total earnings, and it is advised that this amount should be granted by the Council to the borough electrical engineer in substitution for the existing bonus of 16s. per week. The additional amount to be paid for the period to the end of October will be £116, and subsequently, on the assumption of the awards to date continuing at the same figures, at the rate of £162 per annum in addition to his present salary of £750 per annum.

Mr. W. J. Papworth, the burgh electrical engineer, Stirling, has received an appointment at Bristol.

Mr. E. M. Hollingsworth, having accepted a position on the staff of the chief engineer of the United Alkali Co., Ltd., has just resigned his appointment as chief electrical engineer to the St. Helens Corporation, which he has held for 16 years, having succeeded Mr. J. S. Highfield in 1903. Mr. Hollingsworth commences his duties with the United Alkali Co. in January next, and will take charge of their new electrical scheme, which includes the new power station at present under construction at Widnes, and the E.H.T. transmission system.

Mr. H. Ingham, assistant engineer to the Mexborough and Swinton Tramway Co., on leaving to take up a position with the Rotherham Corporation, has been presented by the staff and employés with a watch and card case, also a butter dish for his wife.

The War Office has informed the Barnsley T.C. Electricity Committee that Major Barker has been brought home from France for special services, and that it is impossible for him to be released for regular duties at Barnsley. The War Office has no objection to his being consulted, or giving assistance in any special matter, provided it does not interfere with his work at Woolwich. In view of this, the T.C. has decided to apply for the release of Mr. J. A. T. Carr, formerly outside assistant at the works.

For the appointment of second technical assistant at Newport (Mon.), there were 41 applicants. Five were interviewed, and Mr. T. H. Wood, chief draughtsman and clerk of works, Battersea, was appointed.

Mr. C. J. Spencer, the retiring manager of the Bradford city tramways, who is coming to the London Underground system, was the recipient, on Monday evening last, of a silver flower vase, the gift of the Tramways Committee. The presentation took place at the Town Hall, under the chairmanship of the chairman of the Tramways Committee (Ald. Enoch Priestley), and amongst those present were the Lord Mayor (Mr. H. H. Tetley), Sir James Hill, Bart., M.P., and the new manager (Mr. R. H. Wilkinson). Ald. Priestley paid tribute to the worth of Mr. Spencer, and wished him success in his new labours. Sir James Hill, under whose chairmanship the electric tramways undertaking was started, said that Mr. Spencer had been their only manager up to the present, and the fact of his being a fully-qualified electrical engineer had been of great benefit when the city had taken over and electrified the old steam and horse service. Mr. Spencer, in reply, dated the beginning of the real success of the undertaking of the Bradford tramway from the introduction of covered-top decks, when the winter receipts were almost equal to those of summer. In Mr. Wilkinson, the new manager, Bradford had secured one of the pioneers of goods traffic in this country.

Mr. Frank Castle, municipal electrical engineer, Oudtshoorn, Union of South Africa, left the service of the municipality in September, in order to take up a position with the Griffin Engineering Co., Ltd. His address is now P.O. Box 798, Mutual and New York Buildings, Cape Town.

General.—Dr. J. A. Hosker, previously vice-chairman of the Bournemouth and Poole Electricity Supply Co., Ltd., has been elected chairman of that company, and Mr. H. B. Renwick has been elected deputy-chairman.

Mr. H. E. Boaz, who recently retired from the chief electrical engineer's branch of the New South Wales Government tramway department, after 36 years' service, received a number of presentations.

Sir George Gibb has retired from the Committee on Production, and Sir Cyril Jackson has been appointed chairman.

Mr. A. Henderson, manager of the electrical department of Messrs. Scott's Shipbuilding & Engineering Co., Ltd., Greenock, has been presented with a tea and coffee set and tray by the directors, officials, and electrical department staff, &c., of the firm, on the occasion of his marriage. Mr. Henderson was on the electrical department staff of Messrs. John Brown & Co., Ltd., Clydebank, for many years before he received his present appointment 9½ years ago. We understand that he has been responsible for the electrical equipment of many very large warships and merchant ships, &c. He is a member of the Institution of Electrical Engineers' Ship Electrical Equipment Committee which is at present preparing rules for the electrical equipment of merchant ships.

Roll of Honour.—Private W. R. Y. Kneller, Essex Regiment, formerly on the office staff of the rubber department of the India Rubber Co., Silvertown, died in Turkey on October 29th, 1917. The news has only just been received. He joined up at the outbreak of war, and was wounded at Gallipoli. He was then sent out to Egypt, and was taken prisoner when the first attack was made on Gaza. Gunner S. A. Rushan, R.F.A., who was in the general office, and Private R. Blythe, Sussex Regiment, formerly in the rubber department of the same company, have been wounded. Lance-Corporal F. G. Kane, Berkshire Regiment, who was in the waterproofing department of this company, has been awarded the Military Medal.

Private J. Bowden, Royal Warwickshire Regiment, who has fallen in action, was on the staff of Messrs. Drury and Chaffe, electricians, Torquay.

Private E. C. Bygrave, who has died of wounds, was employed by the Edison Swan Electric Co., Ltd., of Ponders End.

Gunner R. Gem, R.F.A., who was articled at the Carlisle Corporation electricity works, has died of wounds.

Private J. Botten, Royal Sussex Regiment, who has fallen in action, was employed at the Dartford U.D.C. electricity works.

Lance-Corporal J. T. Rose, Guards Machine Gun Corps, who has fallen in action, was employed by Messrs. Siemens Bros., of Stafford.

Private R. D. Howard, Machine Gun Corps, who has died of wounds, was employed by Mr. G. A. Weston, electrician, Southend-on-Sea.

Private W. R. Ward, who enlisted from the electricity works of the Rotherham Corporation, has been wounded in action.

Private F. Millichamp, South Lancashire Regiment, wounded and in hospital at Whalley, was employed by the British Insulated & Helsby Cables, Ltd.

After being missing since August, news has been received of the death in action of Private J. Davies, K.O. Yorkshire L.I., who was employed by the Chloride Electrical Storage Co., Ltd., Clifton Junction.

Private H. H. Mellor, Manchester Regiment, who has died of wounds, aged 38, was employed as a meter inspector in the electricity department of the Oldham Corporation.

Private A. Kettlewell, R.A.F., who was severely wounded and died on October 12th, was employed by Messrs. Dick, Kerr & Co., Ltd., Preston.

Private M. Corrigan, Manchester Regiment, who died on October 4th, whilst a prisoner of war, was employed by the British Westinghouse Co., Ltd., Trafford Park.

Pte. W. Johnson, Machine Gun Corps, who has been killed in action, was employed at the Huddersfield Corporation electric station.

Pioneer H. Brook, R.E., who has died at the front from broncho-pneumonia, was engaged at the works of the Phœnix Dynamo Manufacturing Co., Ltd., Bradford.

Pioneer S. Newbound, R.E., who has died in action, was employed in the Leeds Corporation electricity department.

Private J. Stafford, Royal Munster Fusiliers, an employé of Messrs. A. Reyrolle & Co., Ltd., has been awarded the D.C.M. for exceptional gallantry during a six days' operation. The medal was presented to him at Hebburn Theatre Royal on Thursday evening last week, together with a gold watch from the Hebburn Heroes Fund, and a gold albert from the firm and employés of A. Reyrolle & Co., Ltd. Private Stafford, who is 28 years of age, earned the medal under the following circumstances:—After his company had reached their objective he went back with important messages to battalion headquarters under intense fire; he also went out and brought in a derelict Lewis gun and ammunition, although the locality was being fiercely shelled by the enemy. He volunteered to try and get in touch with the troops on the flank of the company, and this he successfully accomplished in spite of great difficulty.

Pioneer S. Newbould, who was employed in the Leeds Corporation electricity department, has been wounded in action.

Private W. Lowe, S. Lancs. Regiment, previously reported missing, and now presumed killed, was employed at the St. Helens Cable Works, Warrington.

Obituary.—Mr. A. Hatcher.—Mr. Alfred Hatcher, who passed away recently at the age of 72, was in the service of the Electric Telegraph Co. before the transfer to the State in 1870. Subsequently he was attached to the Surveyor's Department of the G.P.O. (S.E. District) as a travelling telegraph inspector, until his retirement under the age limit in 1911. He offered his services in 1917, and for the past year had been employed at Eastbourne Head Post Office.

Mr. J. O. Callender.—We regret to learn of the death of Mr. James Ormiston Callender, Assoc.I.E.E., one of the managers of Callender's Cable & Construction Co., Ltd., at the age of 55 years. Mr. Callender passed away on 19th inst., at Swanage. We hope to refer to the deceased gentleman's career in our next issue.

Mr. W. S. Gibson.—The victims on the liner *Hirano Maru*, torpedoed by a German submarine, included Mr. William Sidney Gibson, who was on his way to duty at Capetown for the Eastern Telegraph Co.

Mr. T. Dence.—The death occurred at Bromley (Kent), on October 12th, of Mr. Thomas Dence, a director of Messrs. Johnson & Phillips, Ltd., of Charlton. Deceased was in his 79th year.

Mr. P. E. Jones.—The death has taken place, in his 58th year, of Mr. Philip E. Jones, electrician, for many years in business at Bangor.

Mr. B. H. Adams.—Mr. Bernard H. Adams, of the Western Telegraph Co., Ltd., died at Pernambuco on October 12th.

Mr. J. F. L. Crosland.—There passed away at Hale, Cheshire, on October 21st, in his 79th year, Mr. J. F. L. Crosland, M.Inst.C.E., M.I.M.E., M.I.E.E., late chief engineer of the Vulcan Boiler Insurance Co., Ltd.

NEW COMPANIES REGISTERED.

British Federation of Iron, Steel, Tinplate and Metal Merchants (Inc.) (word "Limited" omitted from the title by licence of the Board of Trade) (151,654).—Registered October 12th as a company limited by guarantee, not formed for purpose of profit, with an unlimited number of members, each liable for £1 in the event of winding up. Objects: To create a federation of (1) the members of all associations of persons, firms, and corporations interested in, or connected with, the business of buying, selling, importing, exporting, stockholding, and distributing iron, steel, tinplate, and metals which shall become affiliated, (2) the members of all affiliated iron, steel, tinplate, or metal merchants' sections of Chambers of Commerce, and (3) all individual merchants or merchant firms or corporations, or members or representatives thereof interested in any such businesses, and not belonging to any such association or section; to promote the discussion among members of questions affecting their interests, to watch all legislative or administrative action affecting such interests, to collect and circulate information, to afford facilities for co-operation, &c. The first members of the Executive Council are:—R. C. Hindon, 85, Gracechurch Street, E.C.; A. Campbell, Spencer House, E.C. 4; J. King, 50, Lever Street, Manchester; W. Gracie, 8, Dutton Street, Liverpool; Sir Johnstone Wallace, K.B.E., Newcastle-on-Tyne; T. Metcalfe, 23, Dean Street, Newcastle-on-Tyne; C. Wiggins, Queen's Square, Middlesbrough; C. G. Briggs, Royal Metal Exchange, Swansea; H. J. Sayer, Summer Row, Birmingham; A. S. John, 1, Vaughan Street, Llanelly; J. F. P. McInerny, 19-20, Llanfair Buildings, Swansea; E. B. Handley, 33, Temple Court, Birmingham; C. J. McAllester, 20, Vulcan Street, Liverpool; J. Miller, 24, Chapel Street, Liverpool; A. H. Robinson, 6, Rumford Place, Liverpool; J. G. Buchanan, 5, East India Avenue, E.C. 3; F. G. Martin, 4, Lime Street, E.C.; H. Falkner, 361, Old Kent Road, S.E. 1; J. E. Kidd (John Kidd & Sons, Ltd.), Salford; G. Addy, King's Chambers, Angel Street, Sheffield; H. Wilkins, 27, High Street, Sheffield; G. H. Cave, Napier Street, Sheffield; J. B. Lees, 64, Cross Street, Manchester; E. Coventry, 110, Cannon Street, E.C.; W. J. Onions, 3, New Street, Birmingham. Secretary: C. T. Everett. Registered office: 5, East India Avenue, E.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

International Electric Co., Ltd.—Land Registry charge dated October 10th, 1918, securing £600 charged on freehold messuage and garden, Meads Smithan, Downs Road, Purley. Holder: Cyril Woodham Mann, Ravenswood, Bexley, Kent.

Carmarthen Electric Supply Co., Ltd.—Particulars of £2,750 second debentures created September 23rd, 1918, the whole amount being now issued. Property charged: The company's property, present and future, including uncalled capital. No trustees.

CITY NOTES.

Eastern Telegraph Co., Ltd.—The revenue for 1917 was £2,901,579; ordinary expenses £770,354; maintenance of cables, differences of exchange, income and war taxes, &c., £491,963, leaving £1,639,262. Income tax and excess profits duty payable in England, debenture interest, and preference dividend absorb £809,581, leaving £829,681, plus £54,688 brought forward. £500,000 has been placed to general reserve. Dividends and bonus amount to 8 per cent., free of tax, and £64,370 remains to carry forward. Captain H. W. Grant, C.B., R.N., has been appointed managing director, Sir J. Denison Pender having become chairman.

Nairobi Electric Power & Lighting Co., Ltd.—For 1917 the net result is a small improvement over 1916. Interim dividends amounting altogether to 10 per cent. for the year have been paid, less tax, the same rate as for 1916. The units generated were 1,637,990, against 1,495,281; motors connected 793 B.H.P., against 648 B.H.P.; lights connected, 40 watts equivalent, 13,833, against 13,012. The auxiliary steam plant was used to a greater extent than in 1916, and produced about 12½ per cent. of the total units generated. War conditions have prevented the further development of the undertaking.

Victoria Falls & Transvaal Power Co., Ltd.—Net earnings for quarter to June 30th, £229,633, before providing for taxation.

Associated Fire Alarms, Ltd.—Profit £1,617 for year ended June, 1918, against £272 last year. Preliminary expenses and Dominion of Canada stock are to be written down, leaving £515 to carry forward.

Callender's Cable & Construction Co., Ltd.—Interim dividend 5s. per share (5 per cent.).

Electric Supply Co. of Victoria, Ltd.—The lamps connected at March, 1918, were 211,746, compared with 188,402 in the previous year; tramway passengers numbered 4,881,924, against 4,803,895; revenue was £95,009, against £88,238; expenditure £63,567, against £56,990; gross profit £31,443, against £31,248. The balance is £29,730, plus £16,427 brought forward. After deducting debenture interest and redemption, and paying £10,500 on account of arrears of preference dividend, £20,923 remains to carry forward.

Hurst, Nelson & Co., Ltd.—Dividend of 10 per cent. and a bonus of 5 per cent., free of tax, on the ordinary shares. £20,000 to general reserve. £12,000 is reserved for the next half-yearly preference dividend and 5 per cent., tax free, interim dividend on the ordinary shares. Carried forward £20,843.

Electric Supply Corporation, Ltd.: Correction.—On page 379 of our last issue we gave the dividend of this company as 10 per cent. This was, of course, an error, the rate being 1 per cent.

Quebec Railway, Light, Heat & Power Co., Ltd.—Total income for the year ended June, 1918, $2,027,941, a decrease of $34,952. Operating and maintenance expenses $1,235,724, an increase of $79,755. Fixed charges and taxes $696,910, leaving net surplus $95,307.

Dick, Kerr & Co., Ltd.—According to the "Financial Times," the accounts will not be completed in time for the meeting. A notice issued on October 11th that books were to be closed from October 17th to 31st is therefore cancelled, and a further notice will be issued in due course.

STOCKS AND SHARES.

Tuesday Evening.

What ardour there was for immediate peace has been modified into a state of profound gratification at the way in which the war progresses from the Entente point of view, and Stock Exchange markets find there is plenty of business *cum* unlimited confidence. Anticipation seeks eagerly to pierce the *post-bellum* prospects, but there has been a mild rally in some of the stocks and shares which fell heavily in the first rush of exuberant peace-sentiment. On the other hand, further improvements have been secured by prices of securities likely to be affected favourably by conclusion of war, and illumination shares show up well in this movement.

In the Home Electricity list, County of London ordinary have spurted 20s. to 11. City Lights added 10s. to their rise, at 12½. Charing Cross and the West End shares are decidedly better in tone. The imperative necessity for conserving supplies of coal is thought likely to remain a factor for some time to come yet, but the investor looks well ahead, insisting that electricity and gas are certain of prosperity after the war, and that it is well to buy shares in advance. In the check to general buoyancy produced by the German reply to President Wilson, electricity shares held all their previous improvements.

Home Railway stocks have not been neglected in the present optimism. Those of the steam companies have advanced substantially during the last week, and the Undergrounds have marched with them in a quiet way. Rises of a point apiece occurred in Metropolitan Consolidated, Districts, and Underground Electric income bonds, though 'Bus "A" are 3d. easier. Central London assented deferred stock is 2 up at 62½. Potteries Traction preference went back to 11s.

Pronounced bullishness is the feature amongst all things Mexican. Bonds and shares in the utility companies have gone up by leaps and bounds within the past month, and already anomalies present themselves. It is surprising, for instance, that Mexican Light & Power preferred shares should stand almost as high as the company's second mortgage bonds. It is surprising, also, that Mexico Tramways first bonds should be within 10 points of Anglo-Argentine Tramways 5 per cent. debenture stock, which has always received its interest, whereas nothing has been paid on the Mexico bonds since September, 1914. Some think that this is an argument all to the good of the latter, in that payment of some kind must be made to them in course of time, and that any scheme for funding overdue coupons would afford a handsome "bonus." If, however, new money has to be raised for the physical needs of Mexican properties, those who pay the piper will claim to call the tune, and holders of the present bonds may accordingly find their obligations back-numbered. All this is, of course, a matter for speculation, but it deserves to be carefully weighed in the enthusiasm for Mexicans, be they railway or utility issues.

Meanwhile, Mexico Tramways common have jumped to 37, and the first and second mortgage bonds to 64 and 50 respectively, while Monterey Fives gained 2½ at 51½. Mexican Light & Power firsts rose to 70, and seconds to 51. British Columbia preference is 3 higher. Canadian General Electrics have advanced to 114½. Anglo-Argentine Trams are better, debentures and shares alike. Para Electric Railway improved to 4½, Manila Electric capital stock to 80.

Cable securities pursue their monotonous, and satisfactory, advances. The list of good stocks is uniformly strong. Rises are registered by Eastern Extensions, Globe preference, and Anglo-American deferred. Demand is no longer due exclusively to the payments of various dividends free of tax. The reports now in course of issue show that the concerns are doing extremely well, and that dividends could be increased were it not for the incidence of Excess Profits Duty. So the buyers anticipate the time when this shall be taken off, and the companies left free to distribute their profits to proprietors instead of paying them to the Inland Revenue, and the demand is insistent.

Marconis continued to fall until this, Tuesday, afternoon, when a rally occurred. All the various classes gave way, the parent shares crumbling to 4¼ before there was a recovery to 4¼. Americans fell to 29s. 6d., and Marines touched 3 3/16 before they picked up to 31s. and 3⅜. The market explanation of the reaction was that holders came in sellers on peace prospects, and that such realisations were supplemented by profit-takers.

The manufacturing group is quiet. General Electrics have dropped 10s. to 18; British ¼ to 2¼. Callenders fell 5s. to 10, and smaller falls took place in several of the other shares that lately have been in favour. The same trend is noticeable amongst iron, steel, and engineering shares generally, but, on the other side of the slate, improvements took place in rubber shares, which suddenly developed into a good market. Here, again, sellers came in after prices had been rushed up, and the list has receded from the top. Armament shares are beginning to harden up again, and amongst the base-metal descriptions, there has been more inclination to support tin and copper shares after their recent sharp falls.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1917.	Price Oct. 22, 1918.	Rise or fall.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	9	10	9⅜	—	£7 17 0
Charing Cross Ordinary	5	4	3⅝	—	6 3 0
do. do. 4½ Pref.	4½	4½	3⅝	—	6 18 6
Chelsea	3	5	2⅞	—	7 16 10
City of London	8	8	12¾	+ ⅛	6 5 6
do. do. 6 per cent. Pref.	6	6	10	—	6 0 0
County of London	7	7	11	+1	6 7 3
do. do. 6 per cent. Pref.	6	6	9⅞	—	6 1 1
Kensington Ordinary	6	7	8¾	—	6 17 7
London Electric	Nil	Nil	1⅜	—	Nil
do. do. 6 per cent. Pref.	4	5	3½	—	7 2 10
Metropolitan	3	4	2⅞	—	6 10 7
do. 4½ per cent. Pref.	4½	4½	3¾	—	6 18 6
St. James' and Pall Mall	8	9	6¾	—	6 13 4
South London	5	5	3	—	6 13 4
South Metropolitan Pref.	7	7	20/6	—	6 16 7
Westminster Ordinary	7	9	6¾	+ ¼	6 13 6
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref.	6	6	100	—	£6 0 0
do. Def.	1½	1½	23⅜	+ ⅛	6 8 6
Chile Telephone	8	8	7½	—	5 6 8
Cuba Sub. Ord.	7	7	10½	—	*6 13 4
Eastern Extension	8	8	16½	+ ⅛	*4 19 3
Eastern Tel. Ord.	8	8	16½	—	*4 19 1
Globe Tel. and T. Ord.	7	7	14½	—	*4 16 5
do. do. Pref.	6	6	10⅜	+ ⅛	5 15 8
Great Northern Tel.	24	22	94	—1	6 9 5
Indo-European	13	13	58½	—	5 12 0
Marconi	15	20	4¼	+ ⅛	4 9 0
Oriental Telephone Ord.	10	10	8⅛	— ⅛	3 0 0
United R. Plate Tel.	8	8	7⅞	—	*5 3 3
West India and Panama	6d.	1/3	1/9	— ⅛	*3 11 6
Western Telegraph	8	8	17½xd	—	*4 13 5
Home Rails.					
Central London Ord. Assented	4	4	6⅜	—	£6 8 0
Metropolitan	—	1	27	+1	3 14 0
do. District	Nil	Nil	26	+1	Nil
Underground Electric Ordinary	Nil	Nil	3⅝	—	Nil
do. do. "A"	Nil	Nil	7/8	—3d.	Nil
do. do. Income	6	4	88	+1	*4 11 0
Foreign Trams, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	47	—	£6 6 4
Anglo-Arg. Trams. First Pref.	5½	5½	3⅛	+ ⅛	—
do. do. 2nd Pref.	5½	—	3½	+ ⅛	—
do. do. 5 Deb.	5	5	75	+1	6 13 4
Brazil Tractions	—	—	58	—	—
Bombay Electric Pref.	6	6	102	—	£5 11 7
British Columbia Elec. Rly. Pfce.	5	5	61½	+ ⅜	8 2 8
do. do. Preferred	Nil	Nil	42½	—	Nil
do. do. Deferred	Nil	Nil	41½	+1	Nil
do. do. Deb.	4½	4½	60½	—	£7 0 6
Mexico Trams 5 per cent. Bonds	Nil	Nil	64	+4	Nil
do. 6 per cent. Bonds	Nil	Nil	80	+5	Nil
Mexican Light Common	Nil	Nil	36½	+1½	Nil
do. Pref.	Nil	Nil	49	+1	Nil
do. 1st Bonds	Nil	Nil	70	+3	—
Manufacturing Companies.					
Babcock & Wilcox	15	15	8⅜	—	£4 3 8
British Aluminium Ord.	10	10	37/-	—6d.	£5 8 1
British Insulated Ord.	20	20	24	— ⅛	£4 9 0
British Westinghouse Pref.	7½	7½	2¼	—	£6 0 0
Callenders	20	25	10	— ½	£6 5 0
do. 5 Pref.	5	5	5¼	—	—
Castner-Kellner	22	20	8½	—	£5 8 4
Edison-Swan, "A"	—	—	¼	—	Nil
do. do. 4 per cent. Deb.	4	4	75	—	£5 6 0
Electric Construction	7½	10	13	—	£7 5 6
Gen. Elec. Pref.	6	6	108	—	£6 2 4
do. Ord.	10	10	18	— ½	*£5 11 1
Henley	25	25	2¼	—	£5 11 1
do. 4½ Pref.	4½	4½	4	—	£5 12 6
India-Rubber	10	10	17½	—	*£5 14 3
Telegraph Con.	20	20	49	—	*£4 18 0

*Dividends paid free of Income Tax.

MARKET QUOTATIONS.

No changes having taken place in prices during the past fortnight the list published in our issue of October 11th holds good.

A 25,000-KW. Turbine Damaged.—One of two 25,000-KW. single-cylinder impulse turbines in the new West End station of the Union Gas & Electric Co., of Cincinnati, Ohio, was badly damaged in its seventeenth (last) stage at 9 a.m., Wednesday, September 4th. According to *Power*, the seventeenth diaphragm showed evidence of being distorted at top and bottom, causing the wheel blades to rub the diaphragm buckets, crushing and burning them, and also burning off the upper side of all blades on the seventeenth wheel. The speed was 1,800 R.P.M. This turbine, which was of the same general design as that of the 35,000-KW. single-cylinder type,* had been installed about two months. It had been satisfactorily carrying trial loads frequently during this time. On the Tuesday morning before the accident the machine was started at 8 a.m., carrying 12,000 KW. all day. At a little before 9 a.m. Wednesday, the erecting crew had about 20,000 KW. on the turbine, which carried the load well. There was no alarming vibration or sign of serious rubbing. At 9 a.m. there was a loud bang inside the casing, followed by others accompanied by violent vibration which shook the station. The throttle was immediately tripped, but the noise and vibration continued, much modified, until the machine slowed down to about 700 R.P.M., when vibration and noise ceased and the speed decreased normally. The turbine is damaged only in the seventeenth, or last, stage. The seventeenth diaphragm was lifted out and the two halves placed together on the floor, when its warped condition was plainly apparent. There were approximately 350 buckets in this diaphragm, and all but eleven were burned or crushed. The bottom and top halves rubbed badly over an arc of about 3 ft. at both the extreme top and bottom. The bottom half rubbed harder than the top half. The projection of the annular ring where the buckets were fastened in and which was near the key or fastening of the diaphragm, took the severest of the rubbing; the metal of this projection was rubbed away over the 3-ft. arcs mentioned to a depth of nearly half an inch. Other projections at these points made less severe contact. The blades on the seventeenth wheel were 28 in. long and of steel, and had a shrouding over their tips, but no rosary fastening was used. There were about 200 blades on the wheel. It is peculiar that about every tenth blade broke off immediately above where it was fastened on to the wheel; 20 blades broke in this manner, breaking clean and sharp. All the blades which remained on the wheel were burned away at their top edges. The projections on the tips of the blades did not appear to have rubbed; they merely showed the effect of having the shrouding pulled away from them. It is difficult, if not impossible, to tell the exact sequence of events. However, the machine did not overspeed, neither did it take on load suddenly or warm up suddenly. Just before the seventeenth stage let go the switchboard operator noticed that the load increased from 20,000 to 22,000 KW. That distortion of the diaphragm was the primary cause of the trouble was indicated by the fact that the projections on the sixteenth diaphragm top and bottom showed signs of rubbing on both halves. The seventeenth diaphragm was about 11 ft. in diameter over all, and the rim speed of the disk was about 1,000 ft. per second. The turbine was closed up after the removal of the damaged disk and was in operation on the Monday following, or five days after the accident. It could have been put back in service sooner had it not been kept open for the inspection of the engineers of the builders.

Improving Power Factor and Voltage Regulation.—For the last fourteen months the Duquesne Light Co., Pennsylvania, has had in operation on its lines a 7,500-K.V.A., 11,000-volt, 600-R.P.M. synchronous condenser for raising the power factor of the system and maintaining voltage regulation. After this condenser was put in service and its ability to handle the conditions was successfully demonstrated, the company ordered two duplicate machines. One of these was installed during April at the Beaver Falls sub-station, 32 miles (51.5 km.) from the Brunot's Island plant, and connected by two 66,000-volt transmission lines, each having a capacity of 20,000 K.V.A. This station is at the end of the 66,000-volt system, and the load at that point at the present time is only about 500 K.V.A., so the condenser for the present will be used for controlling the voltage, some method of regulation being necessary on account of the line impedance and the comparatively high reactance of the transformers now in use. The other set, when completed, will be placed in the Lawrenceville sub-station, where the conditions are somewhat similar. As the company expands and the load on the system increases, it will very likely continue to place synchronous condensers at the principal load centres, and the time may come, it is stated, when it can obtain practically a flat voltage curve notwithstanding variations in the power factor. Details of these machines and their operation are given in the *Electrical World* of September 14th, in an article by Mr. J. T. Peyton.

* Elec. Rev., October 4th, 1918.

Exports and Imports of Electrical Goods during July, August, and September, 1918.

The official returns of electrical export and import business for the third quarter of the year show a falling-off of over £200,000 as compared with the previous quarter, the large increase in exports for the June quarter being due to an item of £247,000 for submarine cable in May. The figures are as follows:—July, £232,708; August, £246,080; September, £280,438; the record for the previous quarter being—April, £255,771; May, £446,448; and June, £156,311. For comparison we give the export totals for the September quarters of 1916-17-18: £1,092,468, £1,077,177, and £759,226 respectively.

The returns for the past nine months show, under the adverse circumstances, a surprising steadiness in export values, the figures, after eliminating the special item for submarine cable, giving an average monthly total of £234,000.

The electrical import figures for the three months under review are:—July, £152,091; August, £116,656; September, £124,233; these comparing with £87,161 in April, £102,316 in May, and £156,311 in June.

It will be noted that there has been a revival of lamp importation, the September glow-lamp total reaching £29,160. The re-exports of foreign and Colonial electrical material has been on a small scale during the three months, the values being:—July, £3,078; August, £3,331; September, £6,630. The principal item for September was £5,325 for glow-lamps.

Exports and Imports of Electrical Goods and Machinery during July, August, and September, 1918.

	July.			August.			September.		
	Exports.	Imports.	Re-exports.	Exports.	Imports.	Re-exports.	Exports.	Imports.	Re-exports.
Electrical goods and apparatus unenumerated	£34,392	£52,080	£1,201	£33,065	£52,248	£563	£25,580	£23,351	£268
Insulated wire and cable (not telegraphic or telephonic)	19,183	33	389	16,446	—	—	29,218	2,598	—
Electric glow lamps	6,779	14,520	251	7,818	2,643	393	4,095	29,160	5,325
Arc lamps and parts (not carbons)	2,683	19,952	—	4,157	—	—	684	13,580	—
Meters and instruments	11,183	8,891	200	8,131	750	17	13,461	1,713	80
Electrical machinery (including switchboards and transformers)	76,043	37,083	636	86,544	49,732	2,321	98,247	41,027	568
Batteries	8,261	7,261	6	19,025	8,320	5	8,406	5,814	292
Carbons	277	2,837	—	1,080	1,693	16	1,986	185	17
Telegraph and telephone cable, wire, and apparatus	73,907	9,434	395	69,814	1,270	16	98,761	6,805	80
Totals	£232,708	£152,091	£3,078	£246,080	£116,656	£3,331	£280,438	£124,233	£6,630

THE INSTITUTION OF ELECTRICAL ENGINEERS.

Western Centre.

In his inaugural address as chairman of the Western Centre of the Institution of Electrical Engineers, Mr. H. I. Rogers said that all industry should be treated in the future not only as a national question, but as an Imperial one, because if the war had taught Britain any lesson it was surely the value of the Empire to the whole nation. Instead of each individual working as if he were guarding a great national trust, they were all engaged in unnecessary and destructive competition amongst themselves. Manufacturers instead of being prepared freely to exchange the results of their experience and knowledge amongst themselves, were engaged in a fratricidal war. They had now learned the advantages of protection, and (while not perhaps of Government control) of Government co-operation, and they had also fully realised the enormous importance to industry of standardising their products to the greatest possible extent. The workers in the industry, as in all others, were in a state bordering on revolution, and it would be one of the most difficult problems in dealing with the question of reconstruction to teach the worker that if he wanted higher wages, shorter hours, and consequently improved conditions of life, he must produce to the utmost of his capacity. He ascribed the extremely unsatisfactory state of affairs to the following causes:—

1. The extremely unsatisfactory method of power distribution which led to high cost of power, thus crippling the industry.
2. The policy of free imports.
3. The disadvantages of municipal control.
4. The status of the engineer.
5. The divorce of science from industry.
6. The harm often done to the industry by the consulting engineer.
7. The criminal folly of allowing merchants to compete with the home industry by selling cheap foreign manufactures.
8. The want of proper education of the worker.

Our Government, with the approval of a majority of the people, allowed foreign manufacturers to dump their products into this country without their paying anything towards our taxes or rates, making it more difficult for the British manufacturer, who was already sufficiently handicapped, to make his business a properly paying concern. The policy of municipal control of electricity supply had proved most disastrous. At the commencement of the electrical industry not much could have been said against it except on political grounds, but from an engineering point of view it had now proved to have been a gigantic mistake, which would have to be remedied immediately. The whole business must be raised to a much higher plane, and engineers must control their own affairs with perhaps Government co-operation. This would release many of our best men for industry. If the industry was to flourish as it might, the cost of power must be enormously reduced. The war had proved the enormous importance, and, indeed, the indispensability, of the engineer, and they had to see that the country did not forget it in future. How was this to be done? Had even their Institution in the part taken the proper steps to improve the status of the electrical engineer? Why had this question of obtaining a charter, which would once and for all put the matter on a right basis, not been settled. Let them see that it was pushed through energetically. He entered the strongest protest against the policy of the Institution in attempting to separate the technical side of the business from the industrial one. The thing could not be divided, and in the future the industrial side of electrical engineering would have to be looked upon as the all-important one.

Given their charter and the settlement of their little differences, was the engineer going to take his proper place in society? He was afraid not at once; they must inculcate into the budding engineer much more idea of the enormous importance of his work to national life; he must take more interest in the national life, but above all, they must see that he was very much better educated, not only from a technical point of view but also from that of a man of the world. There was not nearly enough ambition among engineers, and too many splendidly equipped men remained in the ranks of the consulting and distribution side of the industry, sometimes, alas, with an extraordinary idea in their minds that they were improving their social position.

A great effort ought to be made in Bristol and other cities where such a thing did not exist, to start a club or institution where engineers and scientific people might gather together for exchange of views, and meetings, and where a good reference library and all the technical papers, both British and foreign, might be available for the members. The present time offered a most suitable opportunity for the starting of an institution of the kind.

He looked forward to a great advance on the part of manufacturers in applying science to their work, and the consequent necessity of employing scientific men. He hoped, too, that the scandal of the low pay of the scientific worker would be done away with, and that a greater number of them would be employed in industrial work.

With the development of the industry, the consulting engineer's occupation would largely disappear. The manufacturers would be invariably able properly to advise and engineer their contracts. Consulting engineers of the future would fulfil similar functions to those of the consulting physician or surgeon. This would lead to a great increase of standardisation, which was a question of the utmost importance to the industry. His firm had been engaged for the last three and a half years in the manufacture of shells, and had found that while the wages per head had rather more than doubled, the output per head had quadrupled in value, though the price of shell had been greatly reduced since the war began. The most successful manufacturing firms were engaged in repetition work. The best example of this in the engineering world was the Ford car, the price of which had been down to practically £90, and they hoped to get down after the war to £75. Meanwhile the firm paid £1 a day minimum wage, had £17,000,000 in the bank, and had 38,000 contented workers. If these figures did not force them to see the paramount importance of standardisation, nothing would. The objection would be raised by many that if standardisation were taken too far progress would suffer, but they were quite wrong; standardisation meant bigger profits, which, broadly speaking, meant advance; it was the want of standardisation that meant stagnation in industry.

Then again, they must see that a stop was put to the too great activities of the merchant. Of his value as an exporting agent everybody was convinced; there were firms which had been of the greatest value to the British producer, but there were too many who had directly injured the manufacturer by simply factoring foreign machinery and apparatus to the obvious detriment not only of the manufacturer, but also of the worker, and thus of the whole community, and in many cases by doing so they had helped to arm the nations who were our enemies in the field at the present time.

Perhaps the most important cause of the failure of the industry was the excessive and unnecessary competition between different manufacturers. In reply to an inquiry, one great firm said that restrictive legislation, and the fact that the home industry was not supported by Government Departments and municipal and other public bodies, were the principal reasons for its failure, and that what was wanted was that manufacturers' standard models should be accepted, and that increased standardisation was required. Another thought that hostile legislation and the policy of buying in the cheapest market were to blame.

Our workpeople wanted better conditions and higher wages, and the only way to do this was to increase the productivity of the workers. The consumer must, however, standardise his requirements. Another firm believed in commercial and technical alliances between manufacturers, leading to an interchange of the best points in the several designs of each concern, and thus doing away with the old keen competition.

A matter of vital importance to the industry was the want of properly educated workers in it. Much more interest in educational matters should be taken by the engineer. Since the commencement of the war the manufacturing engineers in Bristol had approached the Educational Committee, and asked it to afford better facilities for giving technical education to their prospective employés. In September, 1917, a junior technical school was started, which he thought was going to prove of enormous value to the industry. The boys went to the school after leaving the elementary school, and had two years' whole-time education, with a considerable technical bias, and at the same time, quite rightly, general education was by no means neglected. The manufacturers had undertaken to absorb these boys in their works when their time expired. The effect on the boys was most remarkable. He strongly recommended engineers in all districts, where such a thing was possible to approach their Education Committees with a view to starting similar schools. Several firms were sending a number of their apprentices for one whole day a week to the technical school, where they received a more advanced course in technical education which would have the result of doing away, as far as these boys were concerned, with the miserably inefficient and unsatisfactory evening classes. With the spread of education amongst the workers, and the awakening thereby of a fuller realisation of the enormous importance to the nation of each man giving his best, not for any selfish purpose, but for the good of the community, he felt sure that industrial unrest could be greatly reduced. At the same time, the workers who were now in the industry must be taught to realise by practical means that production was the basis on which all wages were paid; by improved methods of production, standardisation, and the willingness of the worker to do his best, this result could be obtained, and they would be able to avoid the cloud of industrial unrest which so many feared was going to burst on the country after the war.

To sum up, what they wanted was not to buy cheaply, but to produce cheaply, and the co-operation of all branches of the industry, the scientific men, manufacturers, consulting engineers, distribution engineers, merchants, and last, but not least, the workers, was wanted to bring about the desired result. How this co-operation was to be achieved was a difficult question. They could ask for Government co-operation, and not control, in the management of the industry. He thought, too, that the Institution should at once forsake its old policy of aloofness from the industry, and take its proper place in leading them, without entering into controversial matters, in the desired direction. The old order had changed, and if competition between firms was, as it would be, reduced to a minimum, they might surely be prepared to give their knowledge and experience to the community through the instrumentality of Institution meetings freely and fully. He believed that if the Institution was prepared to act in this way it could play a great part in reconstructing the electrical industry on lines which would give it the successful future they all looked forward to.

French Glow-Lamp Output.—In a recent communication to the *Bulletin* of the Société Internationale des Electriciens, M. A. Larnaude remarks that the present capacity of French glow-lamp factories amounts to 15-20 millions of lamps per annum, but this figure may be doubled in the near future. The tonnage required for the transport of materials needed in this industry is small, and one ton of ore will provide sufficient material for 3,000,000 lamps. An important element in the manufacture of gas-filled lamps has been the production of argon required for the smaller types. This gas is now being made in considerable quantity by the process of M. Claude.

THE FUTURE OF WOMEN IN ENGINEERING.

In an address delivered before the Conference of the National Union of Women Workers, on October 8th, Mr. Ben. H. Morgan stated that throughout the country there were no fewer than six millions of women employed on works of various kinds. Approximately, a million women were employed on munitions work in engineering and allied trades. This was the great new departure of the war—one million women suddenly projected into a highly technical industry, requiring on the one side a large measure of knowledge and skill, and on the other the utmost physical endurance. These women were producing no less than one-third of the total output of munitions. There were thousands of women engaged on turning operations which involved a considerable measure of skill, some working to 1/1,000th of an inch. Many of these women set up their own work and tools, and ground their tools. They not only did plain turning, but non-repetition work direct from drawings, some, again, working on pieces with seven or eight measurements, practically all using gauges of various kinds, and many using micrometers. While many had acquired a large measure of skill, extremely few could be regarded as skilled in the same sense that men were skilled after having served an apprenticeship to the trade.

In fitting, women had not been so successful as in turning, but nevertheless very large numbers were employed on subdivisions of what was regarded as skilled work. Women were doing all ranges of drilling work; this was a line of work in which women had been as successful as men.

In milling, shaping, slotting, and planing women were executing a great deal of work, and many were capable of setting up in the machine and carrying out a wide range of simple jobs from working drawings. The war had not, however, produced a skilled woman miller or planer. In planing the setting-up was nearly always done by a skilled man, and the woman acted as a machine minder.

Women had made exceptional progress on the marking-off table, reading the most complicated drawings, and using measuring instruments with much greater facility than the average male apprentice. Women had made excellent tracers, and in some cases could piece drawings together, but there were no women draughtsmen at the present time. Acetylene welding was a branch in which women were eminently satisfactory. Women were specially capable of being trained in woodworking, and in the operating of woodworking machines. They were also doing extraordinarily good work in the laboratory as assistants in research work; in the testing room, testing metals, instruments, and engines; in the smithy, the forge, and all kinds of metal-shaping and heat-treating work.

What part were they going to play in our premier industry after the war? There was no more serious question than this for the National Union of Women Workers to consider. Women had opened up a vast field of activity which they should never again relinquish. When peace came, bringing with it the demobilisation of our armies, men would very justly wish to resume their places in the engineering factories of the country. But when this position had been liberally and generously dealt with, vast opportunities would present themselves to women in both the trade and the profession of engineering.

The conference should carefully examine the work which women had done, and estimate what special branches of engineering women should be encouraged to persist in after the war. In some branches of work they were as good as men in both quality and output; in other branches they were superior to men in both respects, while in a large number of other sections of work they were inferior to men, and in peace time they should be discouraged from pursuing any operation in engineering practice that was unsuitable to them.

INDUSTRIAL COAL ECONOMY.

On Saturday, October 12th, Mr. David Wilson, Technical Adviser to the Coal Controller, gave an address to the Association of Engineers-in-Charge on the above subject.

Skipping the opening paragraphs, we will begin to abstract the address at the point where Mr. Wilson tells his audience at least to make an effort to cover as much of the field in this country as possible, and to gather information at first hand. He fears that there has been a little too much selfish pride in individual effort, and is doubtful whether we are progressing as quickly as we ought. We have got to recognise what is being done elsewhere, and go one better. He continues:—

It is my desire to confine myself as far as possible to suggestions which might materialise in the immediate future. I leave the larger economy suggestions which embody reconstruction, &c., and must therefore be post-war, to those possessing greater experience than myself.

The total consumption of coal in the British Isles during the year 1917 can be taken at approximately 180 million tons, and of this amount, approximately 7,500,000 tons

were consumed by the electrical industry, or, say, 4 per cent. The total number of units generated during 1917 was approximately 5,000 millions, so that the average efficiency is represented by a figure of 3.36 lb. per KW.-hour generated. The total coal used by industrial firms, exclusive of railways, coasting steamers, gasworks, and domestic purposes is approximately 100 million tons per annum, and of this, it is estimated that 80 million tons are used per annum directly for power production.

Bearing in mind, therefore, that the electrical industry is collectively the most efficient consumer of coal so far as steam raising is concerned, we cannot expect from this industry any great reduction in total tonnage as a result of further economy.

The absence of detailed information is responsible for a great wastage of coal. The electrical industry has done well in establishing detailed records, but the want of definite knowledge regarding the working of steam plant in many industrial undertakings is deplorable. The Coal Controller sent out a simple questionnaire to all industrial firms in the country, and if the answers had been even approximately correct, I could have put my finger on each inefficient works. I discovered that a great number of the firms had simply approached the boiler contractors or insurance companies, and asked them what number they should multiply the coal tonnage by to get the evaporation figure. I of course fully appreciate the difficulty involved in establishing and maintaining records, but the best managed electrical undertakings have succeeded in doing so, and it should be possible for all industrial firms to at least approach the methods of the key industry. The Coal Controller's records show that even the electrical industry can do much more in this direction.

Coal consumptions vary from 2 lb. per unit to 18 lb. per unit, and the thermal efficiency from 3 per cent. to 16 per cent. The common reply from the inefficient station is that the bad results are due to poor load factor, obsolete plant, &c. But there is too much tendency to let it go at that. How many engineers could supply the detailed information such as the Victoria Falls & Transvaal Power Co. tabulates each week? It is forthcoming from many stations. It should be forthcoming from all stations.

The first thing to do is to establish definitely what each section of the plant is doing. It is unfortunately a fact that in many establishments no interest whatever is taken in the fireman or his work. His selection is often decided more on account of his muscular attainments than upon his ability to burn coal efficiently. I believe that much could be done at once to assist the present coal situation by getting engineers to devote more time to the boiler house. America has done much in this direction. No boiler house of any size should be without some staff fully trained in the scientific combustion of coal. I know of one power station where the engineer in charge is giving weekly lectures to the firemen, which are greatly appreciated, and producing improved results in the boiler house. I suggest that a course of such lectures be given to every boiler house staff, and I shall be pleased to forward information suitable for such lectures to engineers desiring the same.

Much good can be done with simple and obtainable testing apparatus; when I say that relatively few works possess even the pyrometer draught gauges, &c., necessary for intelligently controlling efficiency, it will be agreed that there is much ground to cover before we can say that everything possible is being done. If the average efficiency is going to be raised, the daily performance of each individual boiler should be very closely watched. Every plant should have some simple form of CO_2 analyser. Whilst it is too much to expect in these times that a recorder be fixed to every boiler, one or two "Orsat" sets should be in daily use in every boiler house—an inexpensive, but reliable, piece of apparatus. Much can be done with a few pyrometers, and there is no reason at all why works should be without some fairly reliable data as to the temperature of the escaping gases—yet it is the exception rather than the rule to find such data. In those works, where the average for the complete plant is taken, I would suggest that further economy will follow the close study of each individual unit. Again, I think that arrangements should be made for more accurately determining the actual steam consumption of individual plant. In too many cases do I find that the figures are simply based upon contractors' original guarantees.

I anticipate your question: "What is the good of discussing efficiency when the quality of coal is so variable?" With all due respect, I do not think anyone should approach the problem in that spirit. The present coal crisis confines us very largely to a question of supply and demand. Of course, the highest thermal efficiency is obtained when burning the highest quality coal, but the commercial economic result may be in favour of the low-grade fuel at works where it can be obtained at a low enough price. I have obtained the same thermal efficiency on test with low-grade fuel as with high-grade coal, but with the latter, the good results are maintained automatically after the proper conditions are established, whereas with the low-grade fuel, the fire requires constant attention if the same high efficiency is to be maintained. Whilst, therefore, it is quite possible to show approximately equal results on test, the difference on a month's run may be as much as 10 to 15 per cent., depending upon the amount of attention given to the fires by the boiler-house staff. Some of the best stations in the country have established high thermal efficiencies when using low-grade fuel. For instance, the highest result on record is at an electric power station in the North of England giving an overall thermal efficiency of 16 per cent., using coal having an average calorific value of 10,000 B.TH.U. per lb. The Victoria Falls and Transvaal Power Co. uses coal having a low average value, and a large quantity having a value of only 7,000 B.TH.U., and the results are excellent. Low-grade fuel cannot therefore be taken as a complete explanation of the serious inefficiency of many works.

Whilst there is a general shortage of other fuels, there is a considerable quantity of anthracite Rubbly Culm available for those who can use it. I believe that the majority of firms could take a small percentage of this fuel to mix with the more bituminous fuel, irrespective of the boiler margin or type of furnace, and I suggest that in this direction all can assist by making a special effort to burn as large a quantity of anthracite fuel as possible. It is to the advantage of the nation to consume as much coke as possible in lieu of coal, as in the preparation of coke all the valuable by-products are recovered. There has been far too much prejudice in the past in connection with the burning of coke; it is surprising to note the quantity of coke which is now being consumed at works where the managers had hitherto claimed that such fuel was totally unsuitable. On a hand-fired boiler, a distinct thermal advantage is obtained by using coke, for the simple reason that the hydro-carbon loss which immediately follows the firing of bituminous coal is obviously absent in the case of coke. With many types of mechanically fired boilers this advantage does not occur, but in both cases the use of coke fuel is limited by the quantity which can be consumed per hour on a given grate area and with a given draught. Apart from special appliances, a large number of firms are now burning a percentage of coke mixed with coal. In many instances the two fuels are simply mixed in the bunkers, and the amount which can be used in this way without reducing the output of the boiler plant seems to vary from 5 to 50 per cent.

The London County Council is now consuming considerable quantities of crushed coke on chain-grate mechanical stokers. In one section of the plant coke is being burned alone, and in another section experiments with coke mixed with coal are being made on what is known as the "Sandwich" system. This system consists in placing a division plate in the stoker hopper. The coal is fed into the back portion of the hopper and the coke into the front portion, so that the combined fuel enters the furnace in two distinct layers, the coal being on the top. The volatile gases given off from the bituminous coal on the top maintain the fire brick arch in an incandescent state, thereby establishing early ignition of the fuel bed at the fire door. The results obtained from this system are most promising, not only at the L.C.C. works, but also at other works throughout the country, where the same arrangement is being tried. I believe that the L.C.C. engineer has succeeded in burning a half-and-half mixture of coal and coke in this way, without suffering any appreciable decrease in output.

Whilst it has been possible to obtain a fair idea of the average thermal efficiency of the electrical industry, it is practically impossible to obtain even a fair approximate estimate of the efficiency of industrial firms. At a rough guess, a 50 per cent. boiler efficiency would certainly not be too low, and when we bear in mind that many individual experts have established that a modern boiler unit complete with stoker, superheater, and economiser will give a combined efficiency of at least 80 per cent. on test, it behoves us to fully explore the margin of difference between test conditions and actual working conditions, as we find them throughout the country. There are far too many boilers around the country installed without stokers, superheaters, or economisers; as opportunity offers, steps should be taken to complete such installations so that the final temperature of the gases entering the chimney does not exceed 350-400 deg. F. I suggest that it is possible to bring up the average efficiency of the boiler house to a figure more closely approaching that of test conditions.

Then there is the question of feed water temperature. It is estimated that 1 per cent. of fuel is saved for every 11 degrees rise in the feed water temperature, provided the heat producing this rise in temperature would otherwise be wasted, yet in a great many works heat is being thrown away which could easily be recovered for heating the water. Only this week I had a case before me where pure hot water was being discharged into a drain to an extent which if directed to the boilers would produce a saving of 15 per cent. in fuel. The exhaust from at least a portion of small auxiliary plant should be directed through an oil separator to the feed-water tank, rather than to a condenser, until a maximum temperature of, say, 200 deg. F. is obtained, and in the case of reciprocating engines, it is often more economical to give the feed-water temperature first consideration, in preference to high vacuum; in fact, I predict that the whole question of exhaust steam heating will receive consideration in the future. This will not be limited to the confines of the power station, but will extend

to the possibilities of domestic heating, &c., in a way which may completely revolutionise our previous ideas.

When we think of the billions of latent B.TH.U. in the condenser cooling water which are daily discharged to heat our atmosphere and rivers, for no beneficial purpose, and remember that the recovery of this waste would enable us to utilise from each pound of coal at the very least, 50 per cent. of the heat energy contained therein, instead of the present miserable maximum of 18 per cent., we ask ourselves whether after all we are not working at the wrong end of the stick. Arising out of the above, I would refer to the B.TH.U. discharged during the operation of "blowing down" boilers. We are really barbarous in our treatment of the innocent "B.TH.U." We first try to cremate him, and whilst numbers get past our sentries and escape up the chimney, others who have remained to do a bit more fighting in the first trench, are promptly captured and pushed down a drain pipe to be effectively suffocated—whilst the astral bodies of the remainder pass on to the engine, only to find large battalions thrown into the river to meet final death by drowning. "Blowing down" boilers is, of course, essential, but the amount necessary naturally depends upon the care given to water treatment.

In conclusion, I would say a few words about my mission with the Coal Controller. We all detest the necessity of Government control, and no one detests this necessity more than Sir Guy Calthrop. The Controller has always been most anxious to reduce inconvenience to a minimum, and at the very beginning he desired the assistance of some person who could stand between him and the consumer, first, to advise and protect him against any unjust technical opposition on the part of the consumer as to the allocation of coal, and secondly, to protect the consumer against the allocation of any particular coal which might be unsuitable. During the past year I have investigated 3,100 cases on behalf of the Controller, and the majority of the complaints could not be substantiated. Here you have one of the things which make control a necessity. Every technical complaint received by the Controller has received most careful consideration, and, wherever necessary, a technical representative has actually visited the works and considered the conditions on site, so that the Controller received detailed and accurate guidance as to his decision. He has also recognised that whilst so many are doing their utmost to help, there are others who are not doing their full share, and in fairness to the former he is anxious to see that the whole team pulls together, and when this is achieved, a very considerable saving in coal will result to the benefit of the nation and the consumer individually. He therefore started a coal economy campaign, and whilst it has only been in operation for a short time, the prospects are quite hopeful

It will be necessary to investigate 36,000 cases, and out of 364 works visited during the first few weeks, a saving of 106,000 tons per annum is estimated. Four hundred engineers have very kindly given their part services voluntarily, and these gentlemen will each actually visit a group of firms within their local radius, reporting to headquarters any evidence of inefficiency, and answering a detailed questionnaire which has been specially drafted for the purpose. We have endeavoured to cast over the whole country an economy net, having a large mesh in order that it may be operated quickly, and even if a large percentage of the special industrial fish slip through, the remaining result will be of more direct assistance to the immediate coal situation than if we had waited for a perfect net of small mesh which would produce an ideal haul. As it is, I except a saving of several million tons.

I have not said anything new, but if I have by chance planted a germ of thought in any direction, I hope it may develop. Do not wait until the Controller asks you to do certain things—do them on your own initiative.

NEW PATENTS APPLIED FOR, 1918.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. Sefton-Jones, O'Dell and Stephens (successors to W. P. Thompson & Co., of London), Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

16,231. "Electromagnets." E. N. Holder. October 7th.

16,242. "Ignition tester for internal-combustion engines." W. Carr. October 7th.

16,248. "Mounting for wireless keyboard on aircraft." C. F. Hudson. October 7th.

16,250. "Replacing electric fuses." R. Hacking. October 7th.

16,251. "Electrical conductors." S. O. Cowper-Coles. October 7th.

16,261. "Means for attaching shades to electric lampholders." T. Cracknell. October 7th.

16,268. "Locating-device for overhead electrical supply wires for tramway cars or locomotives." J. C. M. Madagan. October 7th.

16,269. "Electric regulating resistances." E. A. B. Torneblom. October 7th. (Sweden, October 8th, 1917.)

16,278. "Electrically-heated water services and systems." H. A. Gill and A. E. Woods. October 7th.

16,297. "High-frequency electrical signalling." Western Electric Co. (Western Electric Co., U.S.A.) October 7th.

16,337. "Electric signalling systems for mines, &c." Automatic Telephone Manufacturing Co. & C. Remington. October 8th.

16,359. "Ignition arrangements of internal-combustion engines." F. W. Lanchester. October 8th.

16,368. "Vibrating contacts." A. B. Wood. October 8th.

16,374. "X-ray tubes, &c." W. D. Coolidge. October 8th. (U.S.A., December 4th, 1917.)

16,388. "Ignition systems for internal-combustion engines." A. H. Middley & C. A. Vandervell & Co. October 8th.

16,408. "Apparatus for attachment of electric wires to terminals." H. Windibank. October 9th.

16,409. "Name and number index for telephone apparatus." W. H. Dunkley. October 9th.

16,240. "Device for utilising flow of rivers for generating electric power, &c." W. Anderson. October 9th.

16,429. "Ball-pivot bearing for contact-breakers." G. W. Finch. October 9th.

16,444. "Electric welding." British Thomson-Houston Co. (General Electric Co., U.S.A.) October 9th.

16,458. "Telephone apparatus." J. W. Bett. October 9th.

16,469. "Electrical speed-indicator." H. N. Cobbold. October 10th.

16,482. "Electric switches." Simplex Conduits, Ltd., & L. M. Waterhouse. October 10th.

16,491. "Means for controlling alternating currents." British Thomson-Houston Co. (General Electric Co., U.S.A.) October 10th.

16,522. "Electrical relays." H. G. Barwell, Eastern Telegraph Co. and W. Judd. October 10th.

16,536. "Bayonet-joint sockets for electric lamps." F. J. O'Neill. October 10th.

16,546. "Trolly guide for electric tramcars." C. E. Brand. October 11th.

16,549. "Apparatus for electric welding." J. Crichton. October 11th.

16,570. "Sparking plugs for internal-combustion engines." J. E. Barrows and F. Murtagh. October 11th.

16,575. "Electric switch." F. J. Brookes. October 11th.

16,576. "Method of securing electric circuit wires in concrete structures." T. Keenan. October 11th.

16,582. "Automatic telephone systems." W. Cross & D. S. Hulfish. October 11th.

16,600. "High-tension distributor for multi-cylinder internal-combustion engines." Akt. Ges. Brown, Boveri et Cie. October 11th. (Germany, October 20th, 1917.)

16,612. "Portable electric lamps." Etablissements L. Rosengart. October 11th. (France, October 27th, 1917.)

16,631. "Ignition magnetos for internal-combustion engines." A. Alltree. October 12th.

16,653. "Portable accumulators." J. H. Berry & D. W. John. October 12th.

16,659. "Protective arrangements for electric distributing cables, &c." Electrical Improvements, Ltd. October 12th.

16,669. "Means for utilising waste heat in electrical machinery and apparatus." H. F. J. Thompson & T. H. Wood. October 12th.

16,673. "Current-regulating devices for electrically-heated crucible retorts, muffles, melting-furnaces, &c." Morgan Crucible Co. & C. W. Speirs. October 12th.

16,675. "Measuring instruments." Igranic Electric Co. October 12th.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1917.

13,318. Electric ignition apparatus for internal-combustion engines. G. E. Turnbull. September 17th, 1917. (119,073.)

13,341. Electrical driving of machines. A. Berges. November 6th, 1916. (111,463.)

13,420. Accumulator electrode grids. S. Willmer & Apex Electric Accumulator Syndicate. September 18th, 1917. (119,076.)

13,473. Rectification of alternating currents of electricity. S. A. Pollock. September 19th, 1917. (119,081.)

13,542. Means for supporting electrodes in ionic tubes for use more particularly in wireless telegraphy. Osram-Robertson Lamp Works and O. Durdle. September 20th, 1917. (119,088 and 119,089.)

13,547. Electroplating apparatus. J. E. Evans-Jackson (G. T. Potthoff). September 20th, 1917. (119,091.)

13,848. Electrical system for indicating an alarm of fire or such like simultaneously at any required number of points or stations. A. W. Brown. September 26th, 1917. (119,099.)

13,853. Electric accumulators or secondary batteries. F. la Roche. September 26th, 1917. (119,100.)

14,187. Electric hand lamps. M. J. Railing & T. Taylor. October 2nd, 1917. (119,105.)

14,348. Magnetic separation of metals or magnetic bodies from oil flowing through oil circuits. D. Brown & Sons and W. H. Child. October 4th, 1917. (119,110.)

15,040. Electric adapters and the like. N. McLean. October 17th, 1917. (119,119.)

16,120. Process and apparatus for maintaining a constant voltage in lighting circuits. Akt. Ges. Brown, Boveri et Cie. November 11th, 1916. (111,286.)

16,701. Electric cigar lighters, pipe lighters, and like apparatus. M. J. Railing & R. J. H. Hill. November 14th, 1917. (119,141.)

16,721. Lampholders for electric lamps. Fuller Accumulator Co. & A. P. Welch. November 14th, 1917. (119,142.)

16,825. Incandescent electric lights and signals. R. J. Rae. November 15th, 1917. (119,143.)

18,689. Method for transforming by heating in an electric furnace anthracite, coke, and other materials rich in carbon into a product suitable for the manufacture of carbon electrodes. S. E. Sieurin. December 15th, 1917. (119,164.)

19,126. Electric insulators. Soc. Ceramica Rivhard-Ginori. December 27th, 1917. (Addition to 24,631/14.) (119,166.)

1918.

2,006. Electric conductors. Fuller's Wire & Cable Co. and G. Fuller. February 4th, 1918. (119,178.)

4,342. Electrically-propelled road vehicles. Edison Accumulators, Ltd., and J. F. Monnot. March 12th, 1918. (119,192.)

7,074. Electro-deposition of iron. F. A. Shepherd and Brazil, Straker and Co. April 26th, 1918. (119,300.)

9,329. Electrical insulating bushings. British Westinghouse Electric and Manufacturing Co. June 8th, 1917. (116,892.)